AGRICULTURAL CHEMICALS

In This Issue:

JUNE, 1949

Vol. IV No. 6

BE PREPARED TO MEET

STEPPED-UP DEMANDS FOR

TOXAPHENE **CHLORDANE**

More *and more* crops are being destroyed by this year's spreading grasshopper infestation. More *and more* farmers are demanding *quick delivery* of grasshopper-killing Toxaphene and Chlordane.

Be prepared to say "yes" when those hurry-up calls come in. Order your stand-by supply of Toxaphene and Chlordane today from Powell's fully-tested stocks. Available in dust and emulsion forms.

2,4-D AND INPC WEED KILLERS
DDT POWDERS AND LIQUIDS
BOTANICALS • ROTENONE • SABADILLA
PYRETHRUM POWDERS AND EXTRACTS
STIMTOX A
CHLORDANE POWDERS AND LIQUIDS
BHC POWDERS AND LIQUIDS
COTTON DUST CONCENTRATES
TOXAPHENE POWDERS AND LIQUIDS
TETRAETHYL PYROPHOSPHATE
ANTU
AEROSOL FORMULATIONS
PYRISCENTS (insecticide perfumes)
PYRINS
PIPERONYL BUTOXIDE CONCENTRATES

John Powell & Co., Inc.

ONE PARK AVENUE, NEW YORK 16, N.Y.

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POWCO BRAND

KILLING POWER—THAT'S THE THING!

Intimate blends *by Sprout Waldron*

take to the air . . .

In meeting the ever-changing formula needs on an S. O. S. basis, air-dusting of insecticides and fungicides is setting new standards in crop protection. Every growing season the Vahlsing Insect and Disease Control Service is proving this fact.

Behind the whirling propellers and skilled flying techniques stand scientific scheduling and a Sprout-Waldron Intimate Blending System.

The correct formula, free from streaks and ready to fly within an hour's notice, calls for flexible, high capacity insecticide and fungicide production. This modern producer demands equipment which is accessible for rapid, thorough cleaning . . . equipment which assures dust-free operation.

Sprout-Waldron Intimate Blending Systems meet these requisites admirably. For **air-handling**, they provide fresh blends which are light, lump-free and well aerated.

Why not bring Sprout-Waldron your insecticide blending problems? Write or phone Sprout-Waldron & Company, Muncy, Pa.

27

SPROUT WALDRON
Manufacturing Engineers

AGRICULTURAL CHEMICALS

THIS MONTH'S COVER

Closing and stitching bags at the John P. Stevens Warehouse in the heart of America's heaviest fertilizer consuming area at Athens, Ga. Equipment by Union Special Machine Co., Chicago. (See article on bags, beginning on page 26, this issue.)

JUNE 1949
VOL. IV No. 6

In This Issue:

A Monthly Magazine For the Trade

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AGRICULTURAL CHEMICALS

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For Spraying Well Done . . .

The CHAMPION

PORTABLE, ALL-BRASS SPRAYER

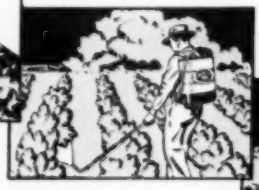
Wherever there is any amount of spraying of any liquid, solution or acid to be done, you can do it well and quickly with the Champion hand-powered, knapsack sprayer. It is the product of more than a quarter century of scientific development, precision manufacture, and experimentation with leading colleges and growers. Many thousands are in daily satisfactory use throughout the world.

The Champion is the one unit that combines all the desirable qualities of unusual power, simple operation, effective control, continuous agitation, and long life.

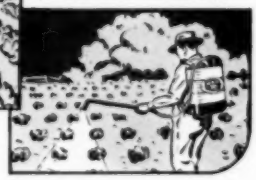
Discharge air chamber eliminates pulsation of outgoing liquid and thereby provides a continuous flow and a greater distance of spray in either a straight stream or fine mist.

Champion fits snugly on operator's back as he walks through greenhouse spraying to right or left, up or down.

Here's power to reach trees as high as 35 ft.



Reach under lowest plants without bending over.



Cover large area of crops quickly and effectively.

SPECIAL CHAMPION BOOM for FAST WEED SPRAYING

For effective weed control, use Champion with concentrated weed killer solution and Boom No. 89. Boom has two Tee-Jet non-corrosive nozzles equipped with 100-mesh screen. Operator can spray path 36' wide wherever he can walk at rate of 4 gals. of concentrated solution per acre.

Champion is an all-purpose, portable sprayer. With it you can spray

INSECTICIDES • FUNGICIDES • ACIDS • OIL • DDT
WATER PAINT • WEED KILLER SOLUTIONS

Virtually any liquid can be used without affecting the synthetic rubber piston and the non-corrosive brass parts. There can be no clogging of the nozzle because the liquid is filtered twice and kept well agitated. Tank is all-brass. Pressure is confined to the piston cylinder, which is made of heavy, seamless brass tubing. Champion flexibility enables you to spray a fine mist or a 35-foot stream up, down, or in any direction. Form-fitting tank is held comfortably on operator's back by adjustable straps.

Jobber and Dealer territories open. Write for details.

CHAMPION SPRAYER CO. 6541 Heintz Ave. **DETROIT 11, MICH.**

Manufacturers of Portable Sprayers and Dusters

The Champion Line for '49

No. 100 Double-Action Duster

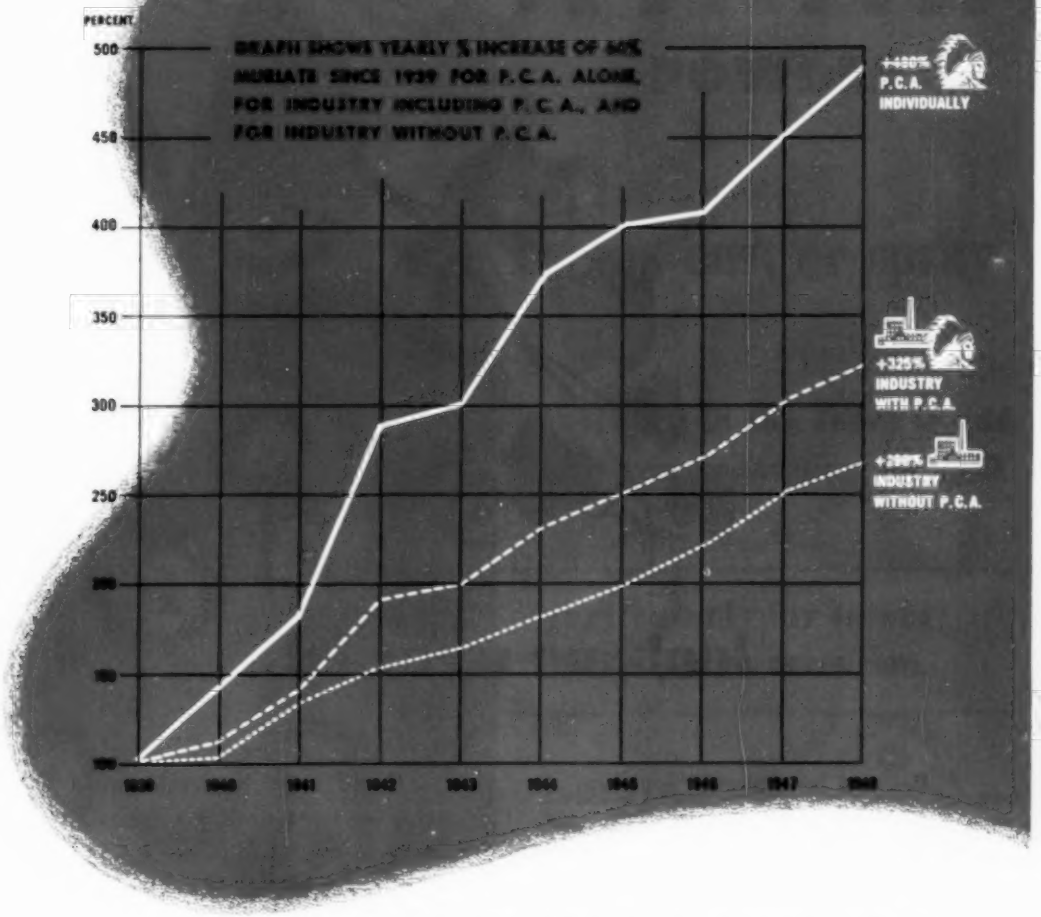
No. 102 Knapsack Spot Duster

No. 103 Hand Duster

No. 204 Slide Sprayer with Tank

No. 202 Utility Slide Sprayer

We've been doing some figuring...



1948 was a record year for domestic Potash. Using '39 as a base, the industry—not including P.C.A.—showed an increase of 280% in 60% Muriate. P.C.A. production lifts the industry increase to 325%. ***P.C.A. alone shows a High Grade Muriate increase for the same period of 480%.***

95% of all P.C.A.'s '48 deliveries were in the form of 60% Muriate. Our new $4,000,000 production and refining facilities now are operating. Our deliveries for '49-'50 will break all previous records. In fact, P.C.A.'s production capacity for 60% Muriate this year will exceed by some 150,000 tons the entire potash consumption — all grades — of the nation ten years ago.

These figures are graphic evidence of the leadership P.C.A. has won . . . leadership in volume, in economy to you and to agriculture.

P.C.A.
the SALT of the EARTH
RED MURIATE

Potash Company of America
Carlsbad, New Mexico

GENERAL SALES OFFICE . . 50 Broadway, New York, N. Y. • MIDWESTERN SALES OFFICE . . First National Bank Bldg., Peoria, Ill.
SOUTHERN SALES OFFICE . . Candler Building, Atlanta, Ga.

look, no weevils!

Benzene hexachloride got them. It also knocks the life out of other cotton-plundering pests too, like the aphid, the leafworm, and the fleahopper. All told, these insects go through a fortune in cotton each year. For the farmer, BHC is a life-saver.

CSC is producing technical-grade benzene hexachloride of a dry, flake type, ideal for grinding. Available to manufacturers who formulate and produce insecticides.

CSC

COMMERCIAL SOLVENTS CORPORATION, AGRICULTURAL DIVISION, 17 EAST 42nd STREET, NEW YORK 17, N. Y.

BAD NEWS for BUGS

APHIDS...ROLLERS...MITES...MEALYBUGS

NIFOS*-T—Monsanto's Tetraethyl Pyrophosphate, Technical—is effective for controlling a wide variety of insect pests. It is very economical because it can be used in formulations at low concentrations—dilutions of 1 to 5,000 or greater result in practical commercial control. It can be formulated for spraying, dusting or aerosol applications . . . Properly applied, it leaves no toxic residue and is harmless to plants. Nifos-T is readily available to commercial insecticide formulators.

NIRAN*—Monsanto's Parathion—is now becoming more freely available in commercial lots. One of the more recent insecticidal chemicals, it is highly toxic to a wide range of greenhouse insects and other pests. It may be formulated for application as liquid spray, wettable powder, aerosol dust.

SPECIAL NOTE . . . Much valuable information is available on Nifos-T and Niran. For data on both of these potent insecticidal chemicals, write MONSANTO CHEMICAL COMPANY, Desk F, Organic Chemicals Division, 1766 South Second Street, St. Louis 4, Missouri, or return the coupon.

*Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS — PLASTICS

MONSANTO CHEMICAL COMPANY
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1766 South Second Street, St. Louis 4, Missouri
Please send me more information on: ( ) Nifos-T, ( ) Niran.

Name _____ Title _____

Company _____

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City _____ State _____

SERVING INDUSTRY . . . WHICH SERVES MANKIND

Announcing.....

METHOXYCHLOR "25E"

By

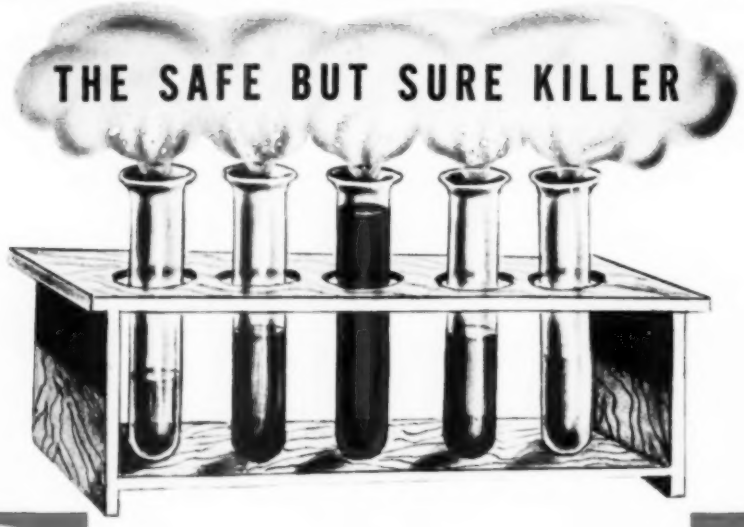
Geigy

THE VIRTUALLY NON-TOXIC SPRAY FOR DAIRY BARNS

In The Emulsifiable Form!

ANOTHER TRIUMPH BY GEIGY'S TEAM OF SCIENTISTS AND LAB TECHNICIANS... THE MEN WHO ORIGINATED DDT INSECTICIDES

METHOXYCHLOR "25E" IS AN EMULSIFIABLE SOLUTION CONTAINING 25% METHOXYCHLOR



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WRITE FOR LITERATURE

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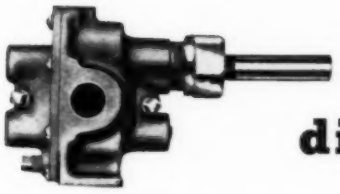
ORIGINATORS OF **DDT** INSECTICIDES

OBERDORFER BRONZE AGRICULTURAL PUMPS



are stocked and sold by better distributors everywhere

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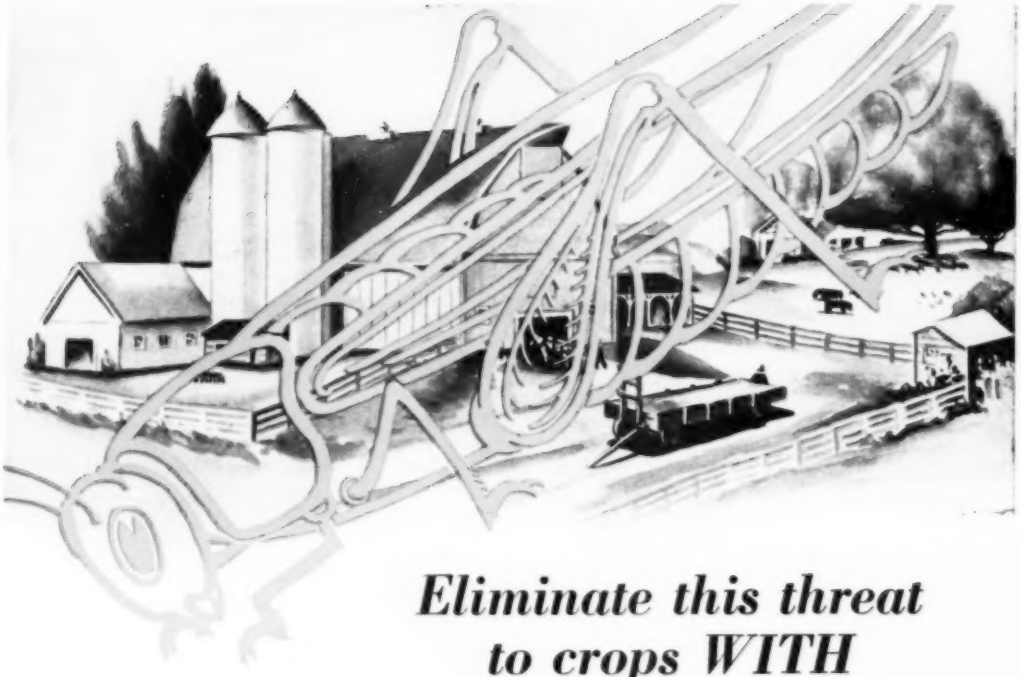

Eliminate this threat to crops WITH

"VELSICOL 1068" CHLORDANE

PREPARE..... To control destructive "hopper" infestations with the insecticide chlordane. It produces a high initial kill and offers residual control action.

USE..... chlordane formulations such as emulsifiable concentrates, wettable powders, or dusts.

APPLY..... chlordane formulation to vegetation along field margins, roadsides and fence rows. Consult your local county or agricultural agent for recommended APPLICATIONS.

EARLY APPLICATIONS ARE MOST EFFICIENT!

"VELSICOL"

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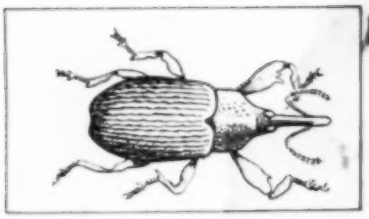

BHC

Toxaphene

FOR EFFECTIVE CONTROL OF COTTON PESTS

BOLL WEEVILS—and many other destructive cotton insects—are efficiently and effectively controlled with POWCO BRAND BHC or POWCO BRAND Toxaphene. Both products are performance-proved...both are in demand and in use in your cotton growing sales areas.

Powell supplies BHC in dust concentrations of various gamma isomer strengths, or combined with DDT as POWCO BRAND Cotton Dust Concentrate. Toxaphene is available as a 40% dust. All are finely ground, free flowing—prepared specifically for easy, accurate formulation of your finished product.

Stocks are available at strategic points for prompt delivery. Order now!

2,4-D AND 2,4,5-T WEED KILLERS
DDT POWDERS AND LIQUIDS
BOTANICALS • ROTENONE • SABADILLA
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CHLORDANE POWDERS AND LIQUIDS
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POWCO BRAND

KILLING POWER—THAT'S THE THING!

2 ways better

1 **SHUR-CLOSE Bags insure less dusting and sifting**

2 **SHUR-CLOSE Bags permit faster flow of material**

SHUR-CLOSE Valve Bags being loaded in hand truck. The positive locking device of the SHUR-CLOSE valve gives quick, complete seal after bag is filled.

SHUR-CLOSE Valve being placed on packing spout. Insertion of sleeves between plies guarantees quick placement on spout. No chance of valve catching spout.

Fertilizer, chemical, food product and flour plants all over the country are stepping up production and reducing dusting and sifting with the brand new SHUR-CLOSE Valve Bag.

Unlike ordinary valve bags, the SHUR-CLOSE overlapping valve action gives a quick, positive seal immediately after bags are filled. There's less dusting when packing and an absolute minimum of sifting when bags are packed.

And you get a second big dividend with the SHUR-CLOSE Valve. The exclusive overlapping action at the top of the valve, pipelines the material while the open slit at the bottom gives faster flow. SHUR-CLOSE Valve Bags step up production as much as one bag more per minute per tube.

If you pack fertilizer, chemicals, food products or flour, you should arrange immediately to have an A&S Packaging Sales Technician demonstrate SHUR-CLOSE Valve Bags in *your* plant using *your* filling machines.

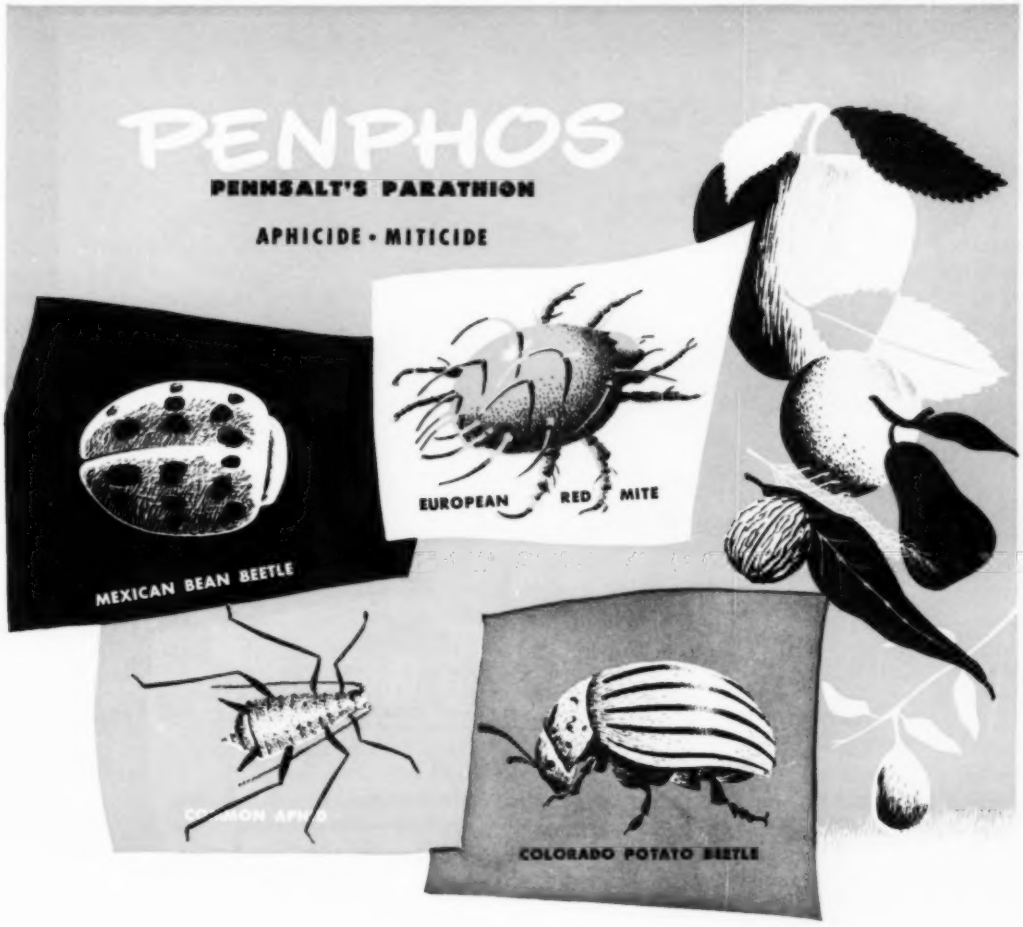
A&S SINCE 1859

ARKELL and SMITHS

Modern Packages for your Products

CANAJOHARIE, N. Y. • WELLSBURG, W. VA. • MOBILE, ALA.

THE OLDEST NAME IN PAPER BAGS



PENPHOS*—containing the new organophosphate material parathion is now ready for prompt shipment by Pennsalt.

During extensive field tests in 1948, PENPHOS, with parathion as the active ingredient, showed high insecticidal efficiency for the control of: Aphids on many fruits, walnuts and vegetables; Red Spider and Mites; Prune Bud Moth; Pear Psylla; Mexican Bean Beetle; Colorado Potato Beetle; Red-Banded Leaf Roller, and certain other insects.

Pennsalt products mean economical and effective insect control. That's because Pennsalt carefully controls the manufacture of its quality insecticide products—assuring top-quality, steady supply, and adequate technical field service.

PENPHOS is available in the following formulations:

PENPHOS W-15 & W-25—wettable powders containing 15% parathion and 25% parathion for use in water suspension sprays. Packaged in 2 lb. and 3 lb. bags, 16 to the case, and in 50 lb. drums.

PENPHOS D-25—a dust concentrate containing 25% parathion for use in the formulation of less concentrated dusts. Available in 50 and 100 lb. drums.

Write, call or wire for Bulletin Penphos-1, giving complete recommendations for use of W-15 & W-25 and recommendations to manufacturers of mixed dusts on handling D-25, labeling and packing the finished insecticide.

Agricultural Chemicals Division, Pennsylvania Salt Manufacturing Company. *Philadelphia 7, Pa. • Bryan, Texas • Tacoma, Washington.*

*TRADE MARK P. S. M. CO.

PENN SALT

agricultural chemicals

These men know farming, they know crops, they know Ded-Weed is a powerful, dependable weed killer . . . safe, easy-to-use and economical.

Ded-Weed is a product of the Mid-West, formulated especially for the crops, the climate and the farming conditions of this great farm belt. It's a quality product that attracts new business, repeat business and assures customer satisfaction and extra sales and profits for you.

THOMPSON-HAYWARD INSECTICIDES CONTROL LIVESTOCK AND CROP PESTS

Crop-destroying, livestock-tormenting insects are quickly and effectively controlled with such Thompson-Hayward Insecticides as DED-TOX, DDT . . . TOXICHLOR*, Chlordane . . . TRI-6*, Benzene Hexachloride . . . PHENACIDE, Toxaphene, PHOSFUME, Parathion and many others.

THOMPSON-HAYWARD CHEMICAL COMPANY

*Reg. U. S. Pat. Off.

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THE EDITOR COMMENTS

REPRESENTATIVE Frank B. Keefe has introduced into the House of Representatives a resolution calling for a seven-member committee to study the effects of using chemicals and compounds in the various steps of food production. The investigation would be conducted along three lines: first, the effects of these materials in the production, processing, preparation and packaging of foods. Second, the use of pesticides with respect to the effect of toxic residues on or in foods; and third, the use of chemicals in fertilizer materials to determine their effect on the soil, nutrition and public health.

Should such a committee come into being, it would be confronted with a tremendous maze of data, at least on the last two phases of the resolution. The committee would soon find that a great deal is already known on these subjects. It would learn that the manufacturers of pesticides have conducted detailed studies along all these lines . . . that universities and colleges of agriculture, experiment station entomologists, plant pathologists and agronomists and hosts of others have also contributed greatly to the total of available knowledge.

Admitting the desirability of an investigation to consider any existing need for additional legislation to assure that food is not contaminated with pesticides, it seems to us that the need is not necessarily for Congressional investigation. Rather, it points up again the continuing need for an intensified educational program reaching down to the grass roots . . . to instruct the manufacturers and processors of these materials; their sales organizations; the people who apply farm chemicals; and finally, the grower down on the farm, whose use or misuse of many of these materials can spell the difference between a clean food crop and one which may carry residues.

Education rather than legislation seems to be the final answer to the whole problem. Let a Congressional committee investigate if need be, but at the same time, let the industry expand its own efforts to pass on to everyone concerned all the information possible. Final success in this complicated field is based on *knowledge* rather than on the making of more laws.

A NUMBER of factors have combined to create a potentially dangerous supply situation in the insecticide field this season. Processors, users of and dealers in agricultural insecticides have been slow to order stock for the current season. This is understandable for a number of reasons. One is the confusion over what to order. With all the continuing confusion over the danger of toxic residues in connection with application of such products as DDT, BHC and the other chlorinated insecticides, few dealers or distributors have thought it wise to stock up heavily. Neither has it seemed prudent to order rotenone or pyrethrum in too great quantities on the chance that the more toxic products may get the green light and be in demand.

The price situation has a distinct bearing, too. In a falling market, buyers naturally postpone making commitments as long as possible, and operate on a hand-to-mouth basis. They order only when they can no longer postpone it.

Yet, entomologists in many parts of the country warn that we are faced by large insect infestations, and that of course means an urgent need for insecticides to be on hand when and where needed. It is a strange commentary that, with this probability, buying at this stage of the season seems to be so far behind the record of previous years. Many people who know, fear that it will be difficult to get stocks of finished insecticides into the hands of users promptly enough for effective use if the expected heavy insect infestations develop.

AN increase of a million tons in fertilizer consumption in the United States during the year ended June 30, 1948 is noted in the ninth annual U.S. D.A. survey which is summarized in this issue of *Agricultural Chemicals*.

During the 1947-48 year, a total of 17.8 million tons of fertilizer were consumed as compared with consumption of some 16.8 million tons in the 1946-47 period. The report details much information regarding the various grades of fertilizer used; in what sections of the country they were consumed; analysis changes from previous years; and other data.

Guest Editorial written especially for this issue of Agricultural Chemicals.

Use fertilizer tax money for research!

by

Dr. Oliver E. Overseth

Executive Secretary,
California Fertilizer Association
Los Angeles, California

IT is indeed fortunate to be living in an era with major emphasis being given to research. On every hand one hears of vast promotional efforts to enlist the aid of mankind to fight cancer, heart disease, and tuberculosis; unlimited research is advocated and conducted in nuclear physics as well as in every other important field. One may rightly ask whether plant food research studies are lagging today, especially when compared with progress made in other industrial fields. To my way of thinking, the plant food industry is somewhat lacking in concerted effort towards solving the many problems which confront it.

It is true that notable progress has been made in some of the older states where plant food investigations have been carried out for a much longer period of time than in the newer Western area. Fertilizer research requires a great deal of time to observe results in the field, which is one reason for the apparently slow progress. However, this lag in time may be overcome by conducting more or more tests each year. Some of the problems for study include minor elements, plant nutrition deficiencies, liquid plant foods, human nutritional deficiencies as affected by lack of essential plant foods in the soil, hormones, fertilizer-insecticide combinations, argicultural minerals, agricultural amendments, and auxiliary plant chemicals combined with fertilizers. These are some of the more perplexing problems facing both the industry and the fertilizer user today.

The American fertilizer industry markets annually about $800,000,000 of plant foods and agricultural minerals, but the major part of research work is being done presently by the Land Grant Colleges and State Universities. A few large fertilizer companies are conducting experimental and test work, but in the aggregate, their individual efforts fall far short of the over all need for research work.

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BAGS.....

Over 18,000,000 tons of fertilizer, lime, insecticides and other agricultural chemicals packed annually in bags . . . a discussion of their correct handling, storing and shipping

IF all the bags used last year to pack and ship chemicals for agriculture in the United States were placed end to end, they would reach about seven times around the world at the equator. Bags of both paper and cloth, but mostly paper, sufficient to make an unbroken path 170,000 miles long, annually carry American agricultural chemicals to market. Based on round figures for tonnages of fertilizers, agricultural limes, insecticides, fungicides and allied materials produced and sold, this adds up to a total of something just under four-hundred million bags of one-hundred pounds each.

Estimates place the yearly use of agricultural limes at 25,000,000 tons of limestone as such, and about one million tons of other types of lime. Of this total, approximately fifteen per cent is packed and shipped in bags—about four million tons—the balance being handled in bulk. Of the total fertilizer 16,000,000 ton output, about eighty per cent is estimated as packed in bags, or thirteen million tons. Of the one-million and up figure for insecticides, fungicides, etc., the largest proportion goes to market in bags. Added together, this gives a rough total of about 18,000,000 tons of agri-

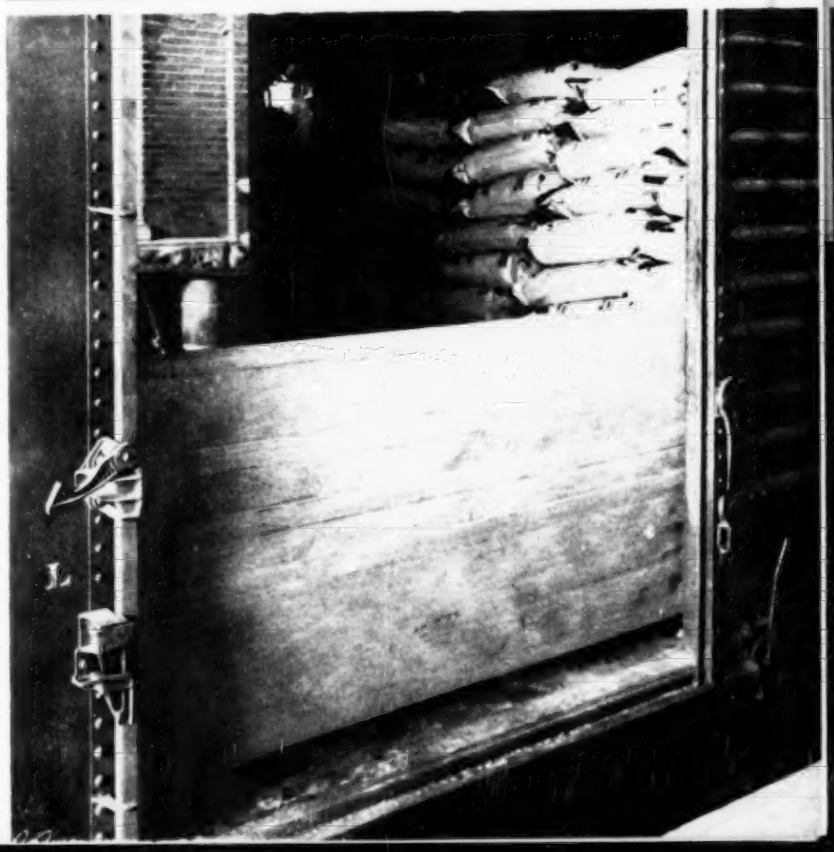
Weighing and filling cloth sacks with 10-14-10 at the plant of the Decatur Fertilizer Co., Decatur, Ala. Equipment by Exact Weight Scale Co., Columbus, Ohio.

cultural chemicals marketed annually in bags.

Because the great bulk of chemical products used in agriculture is shipped in the dry state, the bag has won the position of the premier package for the industry. Low cost, ease of handling, economy in shipping and storage space, and satisfactory durability and protection of the contents—these account for just about complete displacement of most other containers in favor of the bag for dry agricultural chemical products.

For shipment of fertilizer solutions, oil sprays, weed control and insecticide liquid concentrates, naturally tank cars and drums are used. Anhydrous ammonia is shipped in tanks and cylinders. Some relatively high-priced basic compounds such as rotenone and pyrethrum powders, technical DDT, BHC, chlordane, and the like usually rate barrels or fibre drums. But if the value per pound of materials shipped is not too high, and they are dry crystalline or powdered products, bags invariably are the containers. Even in the case of the higher-priced agricultural chemical products, some producers prefer and use bags although the price of the ma-

Eighty pound valve-close bag being placed on packing spout. Insertion of sleeves between piles assures quick placement on spout. Photo courtesy Arkell & Smiths, Canajoharie, N. Y.



Freight car doorway protection for paper bags. Combination of steel strapping and kraft board cuts bag damage in transit. Retaining strips made by Signode Steel Strapping Co., Chicago.

terial may be such that it will "carry" a more costly shipping container. Satisfactory results with the better type bags developed during recent years plus space economies very probably account for this preference, as bag improvements, handling experience and education have tended to reduce shipping losses.

WIDE increase in the use of bags for packing fertilizers and other agricultural chemicals naturally came with expanded production through the war years. From 1942 to 1947, the use of paper bags more than doubled. High cost of burlap tended to accentuate this trend toward paper bags as did improvements in the paper bag itself and in methods of filling and handling. Although cotton and burlap bags continue in active demand in many parts of the country, especially in the southern states, the major share of the increase in bag use has come in the various paper types.

Palletized handling of paper bags with gaspowered carloader, 1800 pounds per load, speeds freight movement at Federal Barge Co., New Orleans. Photo courtesy Clark Equipment Co., Battle Creek, Mich.

Although the overall proportion of cloth bags is steadily decreasing, it has been pointed out that for certain specialized uses, they will probably not be wholly displaced for many years to come, if ever. Against the higher cost of cloth, their advocates point to exceptional durability for long storage, ability to take rougher handling, and greater resistance to the corrosive action of certain types of chemical products. The re-use feature of cloth bags is also an important sales factor in most farm areas.

Of the wide expansion in paper bag use over recent years, the lead for packing fertilizer and agricultural chemicals generally has been taken by the multiwall type. Comparative low cost, while meeting other requirements satisfactorily, has undoubtedly been the deciding factor in sales progress in this market. Of the paper sacks used, estimates give two-thirds of the demand to the open-mouth type and one-third to the valve type. Not too much controversy is noted in regard to relative merits of the two types. Each finds use where it is best adapted. For example, in the case of finely divided insecticide dusts, the open-mouth sack appears to fill the bill because of the fluffy "smoke-like" character of the product. It does not settle quickly and requires jogging and a wide-open top to permit air escape in filling. Sewn valve bags, on the other hand, are filled at such a rapid rate that light dusts are handled only with difficulty.

With the trend toward paper bags in recent years, there has also come a trend toward smaller packaging units. In fertilizer sacking, for instance, it was not uncommon some years back to ship the material in 200 pound burlap or cotton sacks which still find some use. This size while more economical to fill, often proved disadvantageous for general handling, particularly by the farmer or grower. They are simply too heavy for easy handling. Paper bags have a maximum of 100 pound size for fertilizers, but this size is giving ground to the 80 pound weight in the interest of easier handling. Insecticides

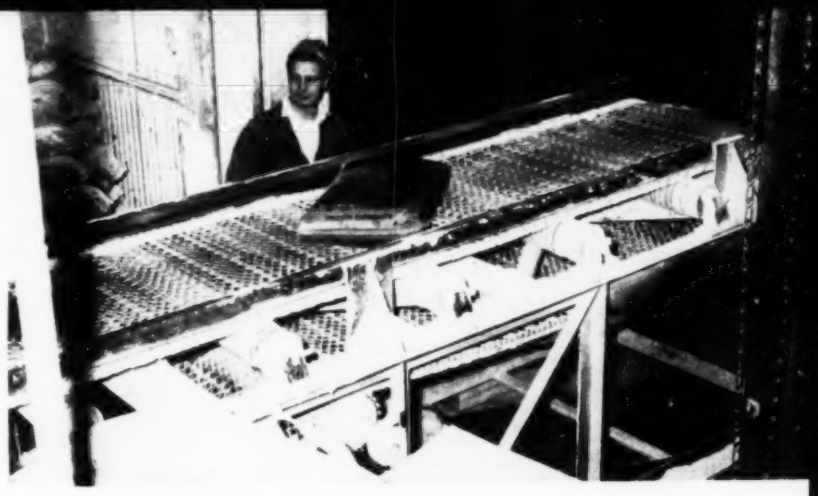
Safe, dry storage of bags is obviously essential to proper protection of their contents. Unit stacking aids in safe and fast handling. Photo courtesy St. Regis Paper Co., New York.

find the fifty-pound sack a maximum standard.

During the past decade, a marked expansion in small unit bags has been noted, stimulated no doubt by the "victory gardens" of the war period and the subsequent wider popularity of home gardening. In this small-bag market, the use of paper is practically universal. Where the units range from two and five pounds all the way up to 25 pounds, paper is held to meet all requirements at lower cost.

TYPES of paper bags vary considerably in weight, texture and construction. The purpose for which they are to be used and the characteristics of the chemicals to be packed are the determining factors in selecting bag types. In the case of ammonium nitrate, for example, there is a serious moisture problem. Accordingly, the 100 pound multiwall bags in which the nitrate is packed are made of six layers of heavy paper with a two-ply asphalt layer to prevent the passage of moisture either in or out. The weight of the 6-ply sacking material used for ammonium nitrate makes a 380 lb. total basis, that is, a ream or 500 sheets of the material weigh 380 pounds. Calcium chloride presents a similar moisture problem. Limestone on the other hand, being unaffected by moisture, presents a relatively simple problem and can be packed in a lighter bag of less complicated construction. Insecticide dusts because of their usual low weight-for-volume, find a light weight bag suitable, although they must be kept dry because of the nature of their use. Few agricultural chemical products present exactly identical problems in choosing a sack of proper type and weight.

"Paper shipping sacks deliver the goods protected." This is the slogan which appears at the bottom of this 14" × 18" educational poster prepared by the Paper Shipping Sack Mfrs. Assn., New York. (Supplied in two colors.) Reproduced by permission of the Association.



Loading or unloading cars by use of portable conveyors cuts down handling and reduces bag damage. The unit shown was built by the Stephens-Adamson Mfg. Co., Aurora, Ill.

As a general rule, the smaller the bag, and the fewer the problems presented by the material to be packed, such as chemical action or moisture exclusion, the less complicated need be the bag structure. For small insecticide packages, for example, duplex or two-wall sacks are suitable, with the number of

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Rohwer, Dunbar, Guterman, Trigg Discuss Toxicity & Residues at

NACA MEETING

IN its first spring meeting under its newly-adopted name, The National Agricultural Chemicals Association, (formerly AIFA) heard Dr. Paul B. Dunbar, Commissioner of the Food and Drug Administration, Washington; E. T. Trigg, chairman of the board, National Paint, Varnish and Lacquer Association, Washington; Dr. S. A. Rohwer, assistant chief, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington, and Dr. C. E. T. Guterman, director, New York State Agricultural Experiment Station, Ithaca; as well as an industry panel.

The meeting was held May 5 and 6 at the Westchester country club, Rye, N. Y., with a record attendance. A considerable number represented custom operators, industry suppliers and others now included in the N. A. C. A. membership.

The Association president, George F. Leonard, Tobacco By-Products Corp., Richmond, Va., opened the meeting on the morning of the 5th by introducing new members of the Association. He commented on some of the current problems confronting the pesticide industry as a whole, and declared that never before has there been so great a need for a revitalized industry, for industry to re-examine itself, and for a greatly strengthened public relations program. He said that the public is now critical of the industry, and that if allowed to run its course, this criticism will at last affect the consumer in his attitudes towards the use of agricultural chemicals. The industry and the Association are trying to understand and solve these problems, Mr. Leonard said, but success depends upon the cooperation of all concerned.

Regarding the problem of legislation, the N.A.C.A. President stated that there is also need for greater understanding of the numerous laws which govern the industry. At present, he said, the pesticide industry is operating under a total of 516 laws which govern nearly every step which is taken. Despite this fact, more legislation is in the offing, both on products already being manufactured and on other preparations yet to come.

Explaining some of the thinking which underlies the Association's recent decision to welcome into membership remixers, distributors, and others in the trade, Mr. Leonard said that this additional group represented the men "at the end of the road"; the end where the pesticide materials actually go to work. He stressed the need for further education at this end of the line, pointing out that too often the men who need instruction most are not close to meetings, have no access to Association bulletins, receive only a few other helps from the U. S. Department of Agriculture and from other sources. "It isn't enough to get these men 'just on our side' ", Mr. Leonard concluded. "We want them to be *with* us!"

Lea S. Hitchner, N.A.C.A. executive secretary and treasurer, Washington, stated in his report that proposed legislation in a number of States presents a serious prospect to the pesticide industry. More than 140 bills which would affect the industry either directly or indirectly, were introduced in various state legislatures during the present sessions, he said. He reiterated the over-all need for uniformity in legislation covering distribution, mixing, use of diluents, etc.

He stressed the importance of air application in agricultural pest control work, and stated again the Association's welcome to air operators.

Dr. Dunbar Speaks

BEFORE presenting his formal paper (complete text of which apears in this issue), Dr. Paul B. Dunbar read to the group a "fan" letter in which the writer

IN THE PHOTOS ——→

Top Row (L to R): Mrs. Geo. J. King, wife of Atlas Powder representative, (cut off by camera); Dave Lynch, Velsicol Corp.; Jack Miller, Atlas Powder Co. Second photo: unidentified man chatting with Wallace Moreland, Rutgers University, and Joseph Noone, N.A.C.A. technical adviser. Second row: Jack Vernon, Niagara Division, Food Machinery Corp., Clark Davis, duPont Grasselli Chemicals Dept., T. H. McCormack, also of duPont, and Ernest Hart, Niagara Chemical Div., Food Machinery Corp. Second picture: Harold Noble, S. B. Penick & Co., Ted Reideberg, D. C. Van Winkle, Julius Hyman & Co., Sam Marshall, Central Chemical Corp., and Paul Torpin, McLaughlin, Gormley King Co.

Third row: Don Sanford, Dow Chemical Co.; Henry J. Wood, Tobacco By-Products & Chemical Corp., Dr. J. L. Horsfall, American Cyanamid Co. and J. M. Merritt, Tobacco By-Products & Chemical Corp. Second photo: Dr. Sylvan Cohen, Gallowhur Chemical Co., Carl Fischer, and Carl Setterstrom, Carbide & Carbon Chemicals Corp. and Steven Post, chemical consultant.

Bottom row: (at table) Charles Hovey, Eastern States Farmers Exchange, W. Springfield, Mass., Friar Thompson, R. J. Prentiss Co., George Poland, Stauffer Chemical Co., and W. H. Prigmore, Eastern States Farmers Exchange. Last photo: Irvin W. Bales, Chipman Chemical Co.; D. Rapp, Hercules Powder Co., George F. Leonard, Tobacco By-Products & Chemical Corp., Mr. Merritt again, and Dr. Alfred Weed, John Powell & Co.

took decided exception to comments made by Dr. Dunbar following the recent publication of a series of newspaper articles on DDT and other pesticides. Commenting on the letter, Dr. Dunbar pointed out that the aims of the F. & D.A. were not at variance with those of the N.A.C.A., since each desired to see that the public is protected in the handling and use of toxic materials.

Commenting specifically on the DDT situation in his prepared talk, Dr. Dunbar stated that there is no ground for hysteria about our milk supply, and termed as "unfounded", stories that the public is being poisoned. He told of recent spot checks on milk from many portions of the nation, and reported that very little DDT was found.

"Gamble a Little"—Rohwer

DR. S. A. Rohwer, commenting further on the current concern over toxic residues, suggested that the "present situation of alarm is due to a lack of education." He said that more research is needed, and that education needs to be carried on at a faster pace. "The public", he said, "is becoming more and more conscious of bugs . . ." and people want to be rid of them. He pointed out the freedom from contamination which is possible only when insects are controlled through the proper use of insecticides, indicating the necessity of having and using these toxicants.

Entomologists have long recommended proceeding slowly and on a firm foundation as the new toxicants began to appear, Dr. Rohwer reminded. He cited the DDT caution statement which was made shortly after the war . . . that there are a number of things about DDT which are unknown . . . and urged the industry to read it again and apply its principle to newer pesticides.

The B.E.P.Q. has tried its best to keep up with the newer and more toxic materials, Dr. Rohwer reported, and has received the whole-hearted cooperation of the industry in this pursuit of information. The cooperation of other Government bureaus was also commended. However, there are some things that simply cannot be speeded up, he noted. As in the case of DDT and dairy cattle, research data are not always available to tell in advance what necessity for action may arise, yet when the occasion demands, action must be taken.

Dr. Rohwer pointed out the necessity for continued cooperation between the men of his Bureau and toxicologists. The Bureau's responsibility is to give out information on how to control insect pests with safety to the ultimate consumer and to those who have to handle the material on its way to the user, he said.

But the matter of toxicology is outside the realm of entomology, which makes it necessary for the two groups to work together. Statements of the toxicologist must be honored, however, as a "guiding star" for information on hazards of various toxicants to fish, wildlife, plants, the fertility of soil and, of course, the user of the insecticidal material.

Looking ahead into the insecticide season for 1949, Dr. Rohwer stated that there may be shortages of materials where needed and at the time needed. He cited as an example, the presence of corn borer over a wide area, and the threat of a grasshopper infestation also over several states. He said that the boll weevil is overwintering in large numbers and may present a considerable problem in the cotton states.

Where such infestations occur, community pest control is needed with the new materials, he reminded. Can industry furnish the stuff? To answer this question, the B.E.P.Q. assistant chief suggested that industry follow up on the best available information on the development of pests as the season develops, and make plans on the basis of this information. "The industry must gamble a little to have material where it is needed, when it is needed," he declared.

He recalled that in 1942, following a heavy infestation of boll weevil in 1941, he had been directed by the Government to see that a repetition of such losses did not occur again. Although just who was to blame for the 1941 disaster was a debatable question, industry was held responsible and the Government proposed to stockpile insecticides for resale at the going rate whenever they might be needed. Although this was never actually done, Dr. Rohwer indicated that the idea might again be advanced. Industry can prevent such action if it keeps alert, he concluded.

Guterman Urges proper Use

DR. GUTERMAN, first speaker on the program of Friday morning, spoke as chairman of the Liaison Committee. He explained that the purpose of the commitee was to bring together all the people who are involved in the problems relating to the use of pesticides and to work out a satisfactory solution. He said that the committee does not make recommendations on specific uses, but presents a broad program of proper use of insecticides. The committee, he said, will deal with residues, and will keep the public informed of its findings.

He suggested several fields of study where considerably more information is needed before any positive progress may be made. These include the need for more information on chronic and acute toxicity of pesticides; improved methods of residue removal, data on how residues are reduced through weathering; more information about application; more about the effect of various toxicants on soil and fauna—although much work is being done in this regard; more cooperation between

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"SPRAY-DIP"

Machine Drenches Cattle in Eight-Second Treatment

DEVELOPMENT of a portable spraying rig for livestock, which is said to saturate the animal in from five to eight seconds of operation, has been announced by the livestock Sprayer Mfg. Co., San Jose, California. The machine, known as "Spray-Dip" is being used widely, according to its makers, and is now in operation in 41 states and in a number of foreign countries.

Object of the "Spray-Dip" operation is to eliminate some of the dangers of dipping; such as drowning and ingestion of toxic materials . . . and to make it possible for ranchers and others to transport the spraying unit to the herd rather than vice-versa. The manufacturers report that units are being operated by owners of both registered cattle and of commercial ranches where only beef animals are to be treated.

Treatment of sarcoptic scab on cattle has been one of the most useful operations of the "Spray-Dip", it is reported. Using benzene hexachloride as the toxicant, good results have come from application through the machine. One test resulted from the discovery by inspectors of the Bureau of Animal Industry, that two shorthorn show calves were infested with the scab at the Kansas City livestock market. The animals were immediately treated with a 1.0% BHC suspension containing 0.12% gamma isomer, and the two were shipped back to their point of origin, in Kansas.

Six days after the treatment, a similar application was made on the remaining 37 cattle and calves in the herd from which the two infested calves had come. This operation, made under the supervision of veterinarians of the State of Kansas and the Bureau of Animal Industry, included the spraying of the exposed barn, sheds, and trucks used for transporting the affected animals. Application was made with a "Spray-Dip" unit by Ray L. Cuff, National Livestock Loss Prevention Board, Kansas City, and William Abildgaard, president of Livestock Sprayer Mfg. Co., San Jose, Calif.

Three weeks following the treatment, the entire group was pronounced completely free of scab, including the two which had been infested at first. A thorough examination of the two, made later by representatives of the Bureau of Plant Industry and the Kansas State Department of Agriculture indicated that the skin of these animals appeared almost normal again.

A sequel to the story is that after the lifting of quarantine, one of the steers was permitted to be shown at the International Stock Show in Chicago during the winter.

The mechanics of the "Spray-Dip" are relatively simple. Some 25 nozzles are placed inside the spraying chamber, arranged to secure maximum coverage of the animal. The pump is operated by a gasoline engine, and puts out a

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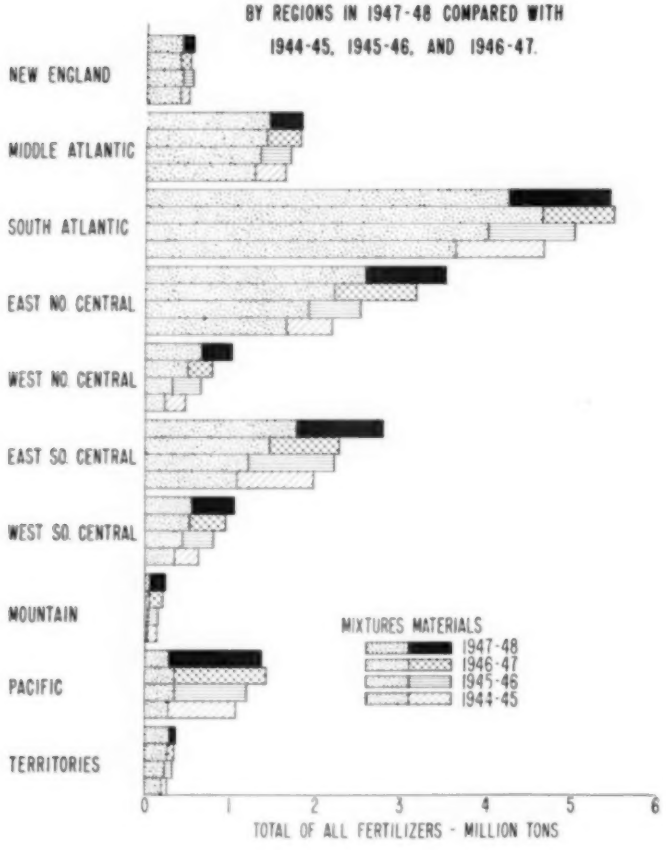
1947-48 Period Sees Increase of Over Million Tons in U.S.

FERTILIZER

THAT the consumption of commercial fertilizer in the United States and territories during the period of July 1, 1947 to June 30, 1948 was the highest on record, is apparent from this ninth annual survey by the U.S. Department of Agriculture. Data herewith show the number of tons of fertilizer reported shipped by manufacturers throughout the forty-eight states and the territories. They also include all government distribution, which altogether, makes the figures practically complete.

The amount of plant food supplied by the fertilizer materials was computed through the tonnages determined in this survey and from analyses from state official analyses bulletins. Fertilizer manufacturers, state fertilizer control officials and agronomists cooperated freely in providing information for the compilation.

FIGURE 1



Total Consumption

SHIPMENTS of commercial mixtures for consumption[1] by agriculture in the United States and Territories amounted to 12.2 million short tons. Separate materials used for direct application to the land amounted to 5.6 million tons, making a total of 17.8 million short tons. This figure is a million tons more than the amount shipped during the year ended June 30, 1947.[2] It represents an increase of 6.0 percent over the past year as compared with an average yearly rate of increase of 10.9 percent for the years 1944 to 1947. The volume of fertilizer shipments for the fall and spring seasons by states and regions is presented in Table 1. Sixty-eight percent of the total was shipped between January 1 and June 30, 1948.

Figure 1 shows shipments of fertilizer diagrammatically, for the geographic regions during the past four years. It is noted that con-

[1] The words consumption, sales and shipments are used in this report as though they were synonymous. The data represent shipments by manufacturers to dealers and farmers, and no doubt differ slightly from actual consumption in agriculture during the period.

[2] Walter Scholl and Hilda M. Wallace, Agricultural Chemicals, Vol. 3, No. 6, 24-29, 59 (1948).

CONSUMPTION

by

Walter Scholl and
Hilda M. Wallace[1]

Division of Fertilizer and Agricultural Lime, Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration
U. S. Department of Agriculture
Beltsville, Maryland

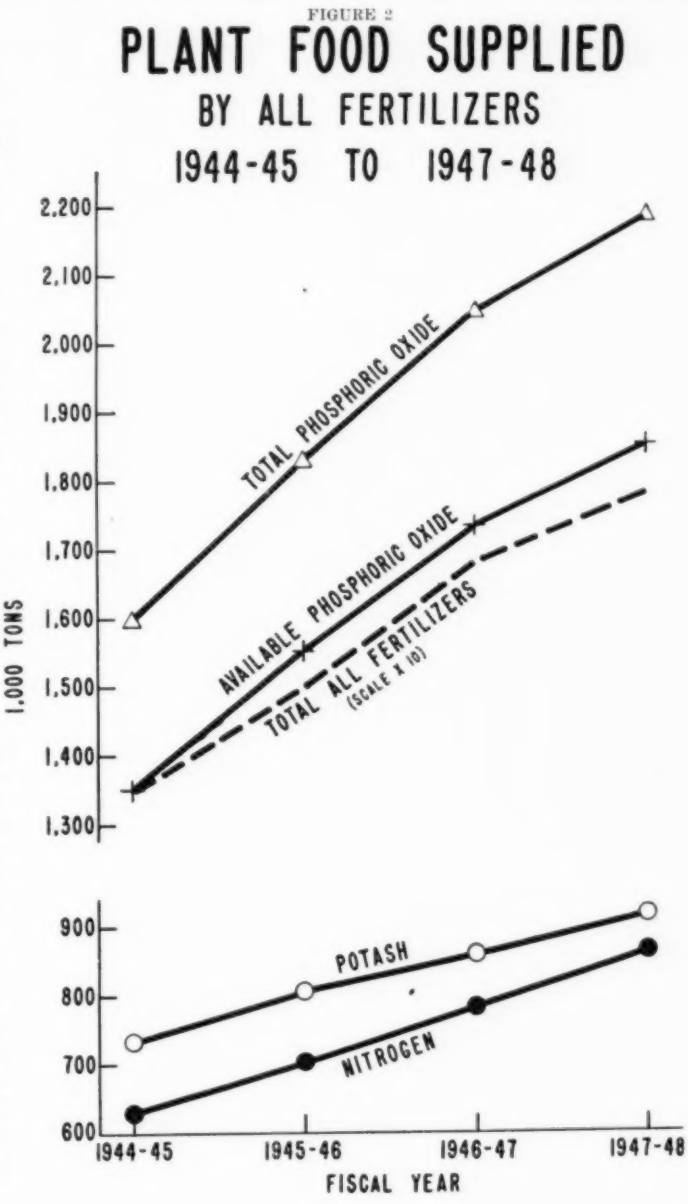
sumption in the New England states appears to be relatively stabilized, and the Middle Atlantic region remained about the same (compared with 1946–47. A decrease is shown in consumption by the South Atlantic and Pacific regions. All other regions show progressive increases.

Proportionately the largest increase was in the West North Central States. The combined consumption of these seven states is less than the consumption in either North Carolina, Georgia or Alabama. Thirty-eight states showed an increased consumption of fertilizer in 1947-48.

Mixed Fertilizers

Mixed fertilizer represented 68.4 percent of the total sales volume, as compared with an average of 68.3 percent for the past three years. The number of specified grades[2] sold in the Continental United States is 850[3]. In addition, there are two to three hundred specialty grades sold by manufacturers. Thirty-five grades, 8 more than

FIGURE 2



[1] Acknowledgment is made to Arnon L. Mehring and K. D. Jacob for advice and assistance in the preparation of the report.

[2] Grades reported by guaranteed analysis. Excludes the number of miscellaneous or specialty grades whose guaranteed analysis is not reported. The tonnage of these miscellaneous or specialty fertilizers, however, is included in the "totals".

[3] The report for year ended June 30, 1947, loc. cit., showed only 335 as the total number of specified grades but did not include 259 miscellaneous grades used in Florida, making a total of 594 grades, exclusive of specialty grades not reported by guaranteed analysis.

in 1946–47, were sold in volume of 50,000 tons or more each and the total represented 89.2 percent of the total tonnage of mixtures. Table 2 shows the volume of sales and the proportion of the total for the principal grades sold in the Continental United States. Sales volume in the Continental United States was 4.0 percent more than in 1946–47.

The 2-12-6 grade has remained the leading grade since 1941. Its sales volume in 1947–48 represents 14.3 percent of the total tonnage of mixed fertilizer. Seventy-four percent of the tonnage of this grade is sold in the East North Central States with Ohio and Indiana consuming over half. The 3-12-6 grade, ranking second, replaced the 3-9-6 grade which dropped to fifth in sales volume. Almost the entire tonnage of 3-12-6 grade is sold in the Middle and South Atlantic States but it is not necessarily the leading grade in the states of these regions. The 5-10-5 grade, ranking third, as last year, is sold principally in the Middle and South Atlantic and South Central States.

The 10 leading regional grades and the tonnage sold in each state are shown in Table 3.

In the New England Region, the 5-10-10 grade is still the best seller as in the past several years. The 5-10-10 leads in all states of this region excepting Maine and Connecticut. In Maine the 6-9-12 grade now leads, having replaced the 5-7-10 grade and in Connecticut the 6-3-6 grade remained the leading grade. The 10 principal grades of this region are the same as in 1946–47 except that the 6-9-9 grade re-

(Continued on page 39)

Table 4

Consumption of Commercial Fertilizer Mixtures and Separate Materials
During the Year Ended June 30, 1948 1/

Unit: 2,000-pound Ton

State & Region	Commercial Mixtures			Separate Materials			All Fertilizers
	July 1 – Dec. 31, 1947	Jan. 1 – June 30, 1948	1947-48 Year Total	July 1 – Dec. 31, 1947	Jan. 1 – June 30, 1948	1947-48 Year Total	1947-48 Year Total
Maine	28,208	212,818	241,026	10,459	5,788	16,247	257,291
New Hampshire	2,421	9,905	12,326	9,078	12,353	20,432	32,758
Vermont	4,960	14,968	19,928	17,068	19,867	36,935	56,863
Massachusetts	7,894	58,252	65,746	7,793	12,253	20,046	85,792
Rhode Island	896	14,294	15,190	1,740	3,546	5,286	20,476
Connecticut	3,503	51,457	54,960	6,462	24,841	25,303	85,263
New England	46,977	361,684	408,662	49,247	77,261	126,508	535,170
New York	58,770	344,484	403,254	91,564	84,580	176,744	579,979
New Jersey	49,218	172,190	221,408	8,347	16,766	25,113	253,516
Pennsylvania	149,453	328,276	477,729	34,104	57,397	97,501	561,230
Delaware	17,686	13,633	31,379	693	2,011	2,704	34,083
District of Columbia	423	887	1,310	121	337	458	1,768
Maryland	96,102	136,303	221,695	8,724	13,130	21,854	243,549
West Virginia	11,154	42,385	54,539	21,696	23,683	44,971	99,510
Middle Atlantic	372,803	1,038,818	1,439,311	180,621	207,704	388,325	1,796,636
Virginia	115,111	390,307	505,418	63,830	88,310	152,140	657,558
North Carolina	425,772	1,143,014	1,568,787	92,880	179,916	273,496	1,842,283
South Carolina	138,656	446,729	585,385	65,918	154,435	220,354	805,739
Georgia	125,034	664,646	789,680	126,251	174,600	290,851	1,080,531
Florida	274,279	372,655	646,934	32,090	39,662	70,312	716,246
South Atlantic	918,852	3,327,311	4,236,164	378,630	626,243	1,004,153	5,240,317
Ohio	296,620	306,000	602,620	26,026	26,810	52,836	655,456
Indiana	227,808	474,682	702,490	37,166	65,189	102,355	802,845
Illinois	108,178	232,658	340,833	305,164	311,269	616,423	1,007,156
Michigan	126,796	222,772	349,566	21,888	40,192	61,880	411,446
Wisconsin	91,308	283,378	374,680	21,647	29,269	50,736	425,416
East North Central	849,604	1,719,488	2,568,789	411,891	472,739	884,230	3,500,319
Minnesota	39,713	97,246	136,959	53,606	86,444	89,050	226,009
Iowa	89,079	156,430	195,509	52,484	61,184	113,622	309,131
Missouri	101,308	140,212	241,517	35,378	46,183	83,561	325,078
North Dakota	11,022	9,998	21,018	6,841	6,066	12,907	33,925
South Dakota	5,886	2,853	8,239	1,845	2,903	4,548	10,787
Nebraska	524	3,152	3,676	8,648	12,820	21,468	25,144
Kansas	29,716	15,133	43,449	31,360	23,328	54,708	98,157
West North Central	243,148	404,822	648,367	189,686	209,908	379,564	1,027,931
Kentucky	67,844	258,429	326,273	66,822	82,797	149,619	475,892
Tennessee	92,203	251,691	343,894	76,965	79,515	156,480	500,374
Alabama	156,806	617,456	770,262	141,643	182,412	324,055	1,094,317
Mississippi	63,601	267,067	330,668	158,714	215,775	374,489	705,157
East South Central	380,454	1,394,643	1,771,097	444,244	560,499	1,004,643	2,775,740
Arkansas	24,121	100,745	124,866	46,715	61,841	108,556	233,422
Louisiana	31,792	126,101	157,893	38,797	66,913	105,710	263,603
Oklahoma	8,218	25,838	34,157	23,248	24,134	47,380	81,547
Texas	57,196	163,471	220,667	110,372	26,229	137,601	458,268
West South Central	121,327	416,156	537,483	244,130	209,317	453,447	1,032,930
Montana	743	2,769	3,512	2,175	6,836	9,011	12,523
Idaho	2,830	7,752	9,582	17,148	31,610	48,758	58,340
Wyoming	1	324	325	1,935	5,748	7,680	8,005
Colorado	2,695	7,257	10,652	6,692	15,829	22,522	32,874
New Mexico	276	716	991	4,242	7,433	11,675	12,666
Arizona	7,304	6,117	13,421	36,860	28,357	65,217	78,638
Utah	1,266	2,764	4,030	4,180	9,299	13,479	17,509
Nevada	12	204	216	256	521	777	993
Mountain	14,876	28,043	42,419	73,278	105,300	178,579	221,998
Washington	9,417	22,283	31,700	21,503	29,408	50,997	82,671
Oregon	5,351	20,108	25,459	8,144	28,377	36,521	61,977
California	103,163	120,196	223,740	326,275	454,091	978,366	1,202,717
Pacific	118,610	162,774	281,384	376,611	511,876	1,065,487	1,347,571
Hawaii	14,363	18,215	34,298	31,745	33,635	64,830	99,128
Puerto Rico	100,211	140,794	241,005	2,261	2,222	4,503	245,468
Alaska	4	2	(2)	16	(2)	(2)	521
Territories	115,614	158,669	275,283	34,676	37,857	72,333	345,187
Continental U. S.	3,042,919	8,892,307	11,935,226	2,547,829	3,324,697	5,872,526	17,807,752
Total	3,161,513	9,048,976	12,210,489	2,582,505	3,362,554	5,944,859	17,855,939

1/ Includes: ground phosphate rock, basic slag, minor element materials, such as borax, sulphur, manganese sulfate, etc. used as separate materials, also fertilizers distributed by government agencies. Does not include liming materials, but includes gypsum.

2/ Grades and materials not available, total estimated from value of shipments imported.

Table 2

Principal Fertilizer Grades Consumed in the Continental U. S. During Year Ended June 30, 1948.

Grade	Consumption	Proportion of Total
	Tons	Percent
2-12-6	1,702,266	14.3
3-12-6	893,822	7.5
5-10-5	866,309	7.4
4-12-6	806,200	6.7
5- 9-6	763,077	6.4
4-12-4	679,389	5.7
5-10-10	597,822	5.0
4- 8-6	592,716	5.0
6- 8-4	463,807	3.9
4-12-7	319,310	2.7
4-12-8	303,813	2.5
4- 8-8	290,778	2.4
3-12-6	228,125	1.9
4- 8-6	225,582	1.9
3-14-7	201,818	1.7
3-12-12	169,823	1.4
3-16-9	128,656	1.1
5-10-10	121,779	1.0
4-12-4	121,153	1.0
6- 7-5	118,585	1.0
3- 9-9	114,507	0.9
6- 9-12	79,796	0.7
0-20-10	75,779	0.6
4- 8-3	74,961	0.6
4-15-8	71,766	0.6
3- 9-6	69,304	0.6
4- 8-8	67,324	0.6
4-12-12	63,779	0.5
2-12-12	61,089	0.5
6- 8-8	57,782	0.5
6-12-4	56,590	0.5
8- 8-8	55,255	0.5
7- 7-7	56,366	0.5
3- 9-18	55,440	0.5
10-10-5	52,108	0.4
35 grades 1/	10,949,661	89.2
378 other grades 2/	1,207,772	10.6
Miscellaneous 3/	17,593	0.2
Total	11,935,226	100.0

1/ All grades with a volume of 50,000 tons or more.

2/ All specified grades with a volume under 50,000 tons. Includes 128 grades under 100 tons.

3/ All other not specified by grade.

Table 3

Principal Fertilizer Grades Consumed in the Regions and States of the United States
During Year Ended June 30, 1948

Unit: 2,000-pound Ton

New England

State	Grades 1/	5-10-10	6-9-12	5-7-10	6-8-7	6-3-6	8-12-16	8-16-16	7-7-7	6-9-9	6-9-15	All Other Grades	Total Mixed Fertilizers
Maine	43	38,378	79,431	37,708	6,215	0	22,465	16,744	864	13,848	11,728	14,946	241,024
New Hampshire	29	4,681	0	0	1,480	17	91	1,001	1,270	0	0	3,806	12,326
Vermont	28	5,593	0	0	929	24	0	2,104	1,104	0	0	10,174	19,928
Massachusetts	36	15,357	0	0	14,242	9,820	0	1,889	7,789	0	0	18,889	68,746
Rhode Island	24	9,821	0	0	1,757	0	1	188	1,117	0	0	2,504	15,188
Connecticut	44	10,182	0	0	10,504	15,371	144	1,253	3,803	0	0	13,203	54,430
New England	65	83,779	79,431	37,708	35,107	25,032	22,701	22,159	15,927	13,848	11,728	61,522	408,642

Middle Atlantic

State	Grades 1/	3-12-6	5-10-5	5-10-10	4-12-8	4-12-4	4-8-12	0-14-7	3-9-12	2-12-6	6-12-6	All Other Grades	Total Mixed Fertilizers
New York	67	42,904	161,941	66,168	10,513	24,251	35,713	569	2,506	3,323	14,342	41,024	403,254
New Jersey	62	21,170	32,036	98,128	48,222	3,575	820	2,014	13,624	51	30	19,038	238,408
Pennsylvania	61	272,184	23,533	53,611	27,617	23,527	12,161	14,680	1,035	8,701	2,061	58,789	477,729
Delaware	29	22,243	4,437	1,866	6,655	112	2,101	2,478	1,894	161	0	9,636	51,579
District of Columbia	16	171	441	0	25	21	149	13	0	5	0	477	1,310
Maryland	39	119,856	18,033	2,847	13,829	4,556	12,838	9,145	11,252	8,906	0	27,281	221,695
West Virginia	20	22,043	3,809	6,804	4,467	13,774	0	2,448	0	90	0	1,804	54,539
Middle Atlantic	110	500,571	241,029	226,232	106,298	69,818	63,452	31,344	30,111	17,337	16,423	133,696	1,436,511

South Atlantic

State	Grades 1/	4-10-6	4-8-6	3-9-6	3-12-6	8-10-5	6-8-8	4-8-8	4-12-4	4-7-5	3-9-9	All Other Grades	Total Mixed Fertilizers
Virginia	42	20,727	0	51,325	193,660	86,547	31,616	54	64,089	0	1,915	124,897	575,418
North Carolina	33	403,259	0	359,037	127,488	66,222	75,991	41,101	34,321	0	39,407	221,981	1,368,787
South Carolina	33	358,737	156	65,990	45,673	92,156	19,372	26,347	8,626	0	42,791	20,499	680,386
Georgia	70	17,422	857,952	107,352	4,281	26,899	88,914	20,582	8,891	82	28,862	176,823	989,640
Florida	43 2/	161	86,965	108	16	2,302	3,829	47,152	3,869	118,471	1,091	418,481	683,934
South Atlantic	478	800,306	592,673	584,420	371,088	243,826	196,522	136,236	119,796	118,553	114,066	961,681	4,238,134

East North Central

State	Grades 1/	2-12-6	3-12-12	4-12-8	0-12-12	3-18-9	0-14-7	0-20-10	8-8-8	3-9-18	5-10-10	All Other Grades	Total Mixed Fertilizers
Ohio	54	519,600	97,809	38,456	12,180	50,873	16,956	3,918	7,279	1,636	22,912	29,105	800,620
Indiana	45	367,319	148,702	15,276	61,110	28,733	12,587	924	7,849	9,424	112	80,454	702,490
Illinois	39	94,688	113,818	26,502	25,808	14,120	6,812	5,825	14,151	6,049	0	34,480	340,733
Michigan	31	203,109	86,045	11,178	11,001	5,677	4,940	2,323	658	9,080	0	45,557	349,566
Wisconsin	47	74,863	108,302	39,543	16,117	12,808	27,773	45,543	7,521	7,967	0	34,443	374,680
East North Central	95	1,259,579	524,676	130,953	126,016	111,711	69,068	58,230	37,458	33,355	23,024	194,039	2,568,089

West North Central

State	Grades 1/	2-12-6	4-12-4	4-16-0	3-12-12	4-12-8	0-20-10	4-16-8	3-18-9	0-14-7	5-10-5	All Other Grades	Total Mixed Fertilizers
Minnesota	52	23,104	10,512	3,207	16,203	16,227	13,832	7,728	7,651	3,386	8,700	11,407	136,959
Iowa	46	53,256	10,073	29,249	30,588	14,648	1,562	7,446	7,255	1,483	1,538	23,402	195,509
Missouri	35	90,680	93,871	1,668	14,986	2,751	1,188	0	0	7,800	2,748	25,678	241,817
North Dakota	27	6,925	2,168	2,121	1,823	1,943	543	200	40	1,197	37	4,021	21,018
South Dakota	15	350	1,050	4,350	0	0	30	200	60	0	30	169	6,239
Nebraska	16	150	1	1,525	0	4	0	0	0	0	917	1,079	3,676
Kansas	20	11,820	11,216	16,849	8	35	0	0	0	262	889	2,368	43,449
West North Central	78	186,289	129,893	68,966	63,605	35,608	17,125	15,574	15,016	14,128	9,859	68,324	648,367

East South Central

State	Grades 1/	6-8-4	4-10-7	5-10-5	3-9-6	2-12-6	4-12-4	4-10-4	4-8-8	6-8-6	6-8-8	All Other Grades	Total Mixed Fertilizers
Kentucky	32	40	0	5,735	74,263	103,304	32,329	0	0	57,092	0	53,510	326,273
Tennessee	21	23,309	0	9,683	101,466	68,963	78,573	20	27,551	8,882	46	31,742	343,894
Alabama	31	333,688	300,394	1,799	50	0	101	90,752	37	0	8,568	34,903	770,262
Mississippi	10	85,952	0	171,224	0	0	30	0	46,329	0	26,276	855	330,666
East South Central	64	442,956	300,394	188,441	175,769	169,267	111,033	90,772	73,917	62,844	34,892	121,010	1,771,097

West South Central

State	Grades 1/	4-12-4	5-10-5	6-8-12	6-10-4	3-9-18	4-8-8	0-14-7	6-8-8	10-10-0	6-12-0	All Other Grades	Total Mixed Fertilizers
Arkansas	20	30,988	36,969	24,155	2,806	16,926	4,372	262	2,814	0	0	4,574	124,866
Louisiana	25	57,245	50,949	442	10,149	0	2,341	6,567	7,238	4,629	0	13,333	157,893
Oklahoma	17	21,288	10,128	6	40	2	5	608	78	0	0	2,002	34,157
Texas	11	103,612	91,197	0	3,680	0	4,953	3,802	0	4,041	5,617	4,265	220,867
West South Central	42	213,133	191,243	24,603	21,675	16,928	11,671	10,939	10,130	8,670	5,617	24,174	537,783

Mountain

State	Grades 1/	10-20-0	10-10-0	6-30-0	10-16-8	10-18-5	10-10-5	7-21-7	4-12-4	14-6-0	6-24-6	All Other Grades	Total Mixed Fertilizers
Montana	12	1,496	0	881	0	1,322	5	0	0	0	0	166	3,962
Idaho	28	2,833	2,266	714	1,378	30	1,045	0	0	0	0	1,996	9,962
Wyoming	5	113	0	0	0	350	0	0	0	0	0	92	555
Colorado	45	986	0	1,683	2,290	167	8	1,117	185	0	792	3,415	10,642
New Mexico	18	180	83	0	0	0	22	0	386	0	0	350	991
Arizona	26	7,025	4,471	0	0	0	241	0	2	819	0	896	13,461
Utah	20	1,270	8	862	0	79	205	0	348	0	0	1,258	4,030
Nevada	7	31	0	0	0	0	131	0	20	0	0	34	216
Mountain	86	13,631	6,828	3,810	3,677	1,948	1,657	1,117	911	819	792	8,229	43,419

Pacific

State	Grades 1/	10-10-5	17-7-0	8-8-4	6-10-4	6-9-6	8-10-10	8-10-12	10-20-0	3-10-10	4-10-10	All Other Grades	Total Mixed Fertilizers
Washington	53	2,648	0	0	4,360	0	6,581	0	485	4,750	46	12,736	31,562
Oregon	40	902	0	0	2,143	20	4,115	0	334	3,656	2	14,883	26,056
California	207	46,901	32,446	31,296	19,220	11,268	24	10,104	7,971	14	6,785	57,719	223,748
Pacific	244	50,481	32,446	31,296	25,723	11,288	10,691	10,104	8,790	8,420	6,835	85,340	281,364

1/ Exclusive of special mixtures or miscellaneous grades, not specified by guaranteed analyses.

2/ In the 1946-47 report, loc. cit., only grades sold in other States of the region and duplicated in Florida were counted making the total of 73; actually 332 grades were sold excluding specialty grades, whose guaranteed analysis was not reported.

Table 5

Consumption of Plant Food, by States and Regions, Year Ended June 30, 1948[1/]

Unit: 2,000-pound Ton

State & Region	In Mixed Fertilizers				In All Fertilizers				Average Total Plant Food percent
	Nitrogen	Phosphoric Oxide		Potash	Nitrogen	Phosphoric Oxide		Potash	
		Available	Total			Available[2/]	Total		
Maine	14,497	24,204	25,991	29,418	15,001	26,871	28,722	29,470	27.7
New Hampshire	606	1,367	1,408	1,194	1,032	5,224	5,400	1,339	23.2
Vermont	879	2,604	2,704	2,175	958	10,434	10,706	2,217	23.9
Massachusetts	3,600	5,932	6,260	5,555	4,492	8,227	8,648	5,980	21.8
Rhode Island	779	1,537	1,639	1,407	883	2,063	2,247	1,459	23.1
Connecticut	3,066	4,447	4,699	4,316	4,485	6,448	6,754	5,382	19.6
New England	23,416	40,091	42,701	44,063	26,851	59,267	62,477	45,847	24.6
New York	19,534	46,443	48,417	29,987	23,089	78,691	81,632	30,429	22.8
New Jersey	10,769	24,562	26,001	19,773	12,708	26,814	28,299	20,523	23.7
Pennsylvania	17,076	57,332	59,544	34,125	17,988	73,342	75,784	34,266	22.2
Delaware	1,777	6,041	6,248	4,025	1,915	6,438	6,666	4,056	22.9
District of Columbia	74	128	134	80	97	158	164	85	19.2
Maryland	7,743	26,139	28,004	16,274	9,045	29,081	31,012	16,324	22.3
West Virginia	2,003	6,769	7,205	3,574	2,307	15,749	16,506	3,985	21.8
Middle Atlantic	58,976	167,414	175,553	107,838	67,149	230,283	240,063	109,268	22.6
Virginia	18,557	59,508	61,971	36,018	25,960	83,078	86,859	36,275	20.8
North Carolina	53,161	132,516	139,198	88,537	79,190	146,902	154,052	92,423	19.4
South Carolina	27,893	68,676	72,062	43,988	57,354	80,338	84,177	49,922	20.8
Georgia	40,096	86,643	91,509	60,482	62,039	114,133	119,931	63,215	18.7
Florida	30,495	47,675	61,962	46,807	34,598	52,488	67,935	49,235	18.8
South Atlantic	170,202	395,018	426,702	275,830	259,131	476,939	511,954	291,074	19.6
Ohio	19,578	101,365	111,206	61,664	22,494	108,079	119,858	61,958	22.6
Indiana	15,905	87,719	94,712	62,582	19,648	100,082	120,465	63,776	22.9
Illinois	6,924	42,340	45,703	33,496	13,781	73,362	245,510	39,416	12.6
Michigan	7,969	45,648	49,074	31,067	10,820	55,632	60,185	31,231	23.7
Wisconsin	8,528	51,983	55,550	38,074	13,359	58,026	63,703	38,435	25.8
East North Central	60,904	329,054	356,244	226,883	80,102	395,181	609,721	234,815	20.3
Minnesota	4,003	21,339	22,324	12,880	5,641	39,761	43,163	12,950	25.8
Iowa	6,105	27,325	29,320	15,077	11,431	44,883	55,017	15,863	22.6
Missouri	7,401	29,701	32,563	14,830	10,952	43,040	51,793	15,205	21.3
North Dakota	607	2,974	3,150	1,484	630	5,781	6,229	1,483	23.5
South Dakota	255	971	989	102	365	1,850	2,050	102	21.5
Nebraska	233	543	581	73	4,237	2,679	2,881	73	27.9
Kansas	1,630	6,127	6,542	1,265	4,324	18,177	19,719	1,303	24.2
West North Central	20,234	88,980	95,469	45,711	37,560	156,171	180,852	44,679	23.2
Kentucky	10,780	35,370	37,274	20,336	14,070	59,308	71,347	20,562	19.7
Tennessee	11,148	37,009	38,996	19,782	16,691	64,903	67,899	20,792	20.5
Alabama	37,563	70,707	72,770	41,935	58,327	100,201	105,647	45,315	18.4
Mississippi	17,971	31,045	32,694	19,449	65,551	54,944	60,928	21,311	20.1
East South Central	77,422	174,131	181,734	101,502	154,639	279,356	305,821	108,980	19.4
Arkansas	6,999	12,754	13,379	10,230	20,278	23,333	24,246	13,069	24.5
Louisiana	7,678	17,597	18,387	7,832	23,477	25,083	27,382	8,813	21.9
Oklahoma	1,454	3,984	4,149	1,528	1,923	8,251	16,976	1,540	14.4
Texas	10,274	24,606	25,709	10,125	19,541	66,310	69,456	10,279	21.0
West South Central	25,405	58,941	61,624	29,715	65,219	122,977	138,060	33,701	21.5
Montana	340	803	855	73	583	3,563	3,665	74	33.6
Idaho	919	1,577	1,634	315	2,846	12,211	12,567	494	26.5
Wyoming	51	100	103	18	262	1,420	1,453	18	20.6
Colorado	841	2,126	2,189	597	2,142	6,775	6,970	1,043	30.3
New Mexico	66	131	136	30	884	2,218	2,311	34	25.2
Arizona	1,417	2,173	2,258	57	7,946	7,867	8,174	481	20.7
Utah	383	773	804	66	1,321	3,417	3,664	84	27.8
Nevada	20	25	28	14	34	194	206	15	24.5
Mountain	4,037	7,708	8,007	1,170	16,018	37,685	39,010	2,243	25.2
Washington	1,907	3,367	3,538	2,621	6,404	8,839	9,422	3,864	23.1
Oregon	1,774	3,174	3,320	2,045	7,036	10,454	11,258	2,744	23.4
California	21,698	22,070	23,968	10,402	104,353	55,216	56,846	14,439	14.5
Pacific	25,379	28,611	30,826	15,068	117,793	74,509	79,526	21,047	15.6
Hawaii	3,997	2,540	2,818	5,819	15,041	5,890	6,249	10,663	31.9
Puerto Rico	23,309	15,203	16,021	21,300	25,060	15,431	16,259	21,408	24.9
Territories[3/]	27,306	17,743	18,839	27,119	40,101	21,321	22,508	32,071	26.9
Continental U. S.	465,975	1,289,948	1,378,860	845,780	824,482	1,832,318	2,167,384	888,654	20.2
Total	493,281	1,307,691	1,397,699	872,899	864,583	1,853,639	2,189,892	920,725	20.4

1/ Includes Government distribution.

2/ Includes 5% of the phosphate rock as available P_2O_5, where used for direct application.

3/ Exclusive of Alaska, total plant food approximately 180 tons.

placed the 4-12-4 grade. Sixty-five specified grades were consumed in this region, the leading 10 of which represented 85 percent of the total sales volume. Sales volume was 3.1 percent more than in 1946–47.

The leading 9 grades sold in the Middle Atlantic States in 1946–47 were also the principal grades sold in 1947–48. Grade 6-12-6 replaced the 4-8-10. The general order of sales in each state remained approximately the same as in 1946–47. Of the 110 specified grades sold, the leading 10 represented 91 percent of the total volume of sales in this region. Sales increased 2.5 percent.

The 10 principal grades sold in the South Atlantic Region were practically the same as in 1946–47 except that 4-8-8 has replaced grade 3-8-5. The 4-10-6 grade became the leading grade, replacing 3-9-6 which

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Table 4

Principal Fertilizer Materials Consumed as Such, by States and Regions, During Year Ended June 30, 1948 1/

Unit: 2000-pound Ton

State & Region	Ammonium Nitrate	Ammonium Sulfate	Calcium Cyanamide	Sodium Nitrate	Other Chemical Nitrogen Materials 2/	Dried Manures 3/	Other Organics 4/	Phosphate Rock 5/	Super-phosphates 18-21%	Super-phosphates 29-48%	Other Phosphates 6/	Muriate of Potash 50 & 60%	Other Potash Salts 7/	Minor and Secondary Elements 8/	Total
Maine	432	57	348	724	88	977	90	0	13,286	1	167	25	5	78	16,267
New Hampshire	39	9	27	590	0	116	180	41	19,100	3	90	229	25	5	20,432
Vermont	35	5	28	281	30	81	30	0	36,021	16	326	68	0	2	36,928
Massachusetts	234	107	228	2,750	2	1,528	3,790	80	9,631	(9)	884	632	0	30	20,088
Rhode Island	34	63	25	243	0	241	530	200	2,374	0	96	76	0	25	3,896
Connecticut	89	83	153	1,861	79	1,037	13,931	1	6,851	30	1,393	451	2,631	363	28,923
New England	831	314	807	6,449	179	3,978	18,551	322	87,472	52	2,928	1,481	2,661	503	128,508
New York	2,388	798	1,432	11,488	310	2,474	3,712	198	151,151	14	887	487	97	328	175,724
New Jersey	482	206	3,327	6,176	170	1,627	1,281	41	10,191	21	991	1,206	118	196	25,113
Pennsylvania	160	420	758	1,839	122	2,589	3,448	501	76,146	202	1,048	99	69	121	87,801
Delaware	70	0	61	482	10	123	36	0	1,856	0	41	42	0	3	2,706
District of Columbia	0	0	1	78	0	201	80	0	55	0	63	0	0	0	458
Maryland	1,186	7	1,073	3,971	50	664	75	0	14,123	0	488	30	67	121	21,884
West Virginia	298	234	39	899	3	193	30	0	43,241	0	16	7	0	34	44,971
Middle Atlantic	4,580	1,665	6,691	23,913	665	7,871	8,642	740	296,763	237	3,514	1,931	350	783	358,328
Virginia	4,029	128	2,173	24,724	7,632	327	411	0	86,156	10,273	4,538	292	91	10,666	152,160
North Carolina	4,134	2,016	6,721	105,840	25,652	1,327	1,464	435	56,579	2,930	13,072	4,932	5,213	43,161	273,498
South Carolina	2,463	5,697	1,124	99,553	26,117	165	347	430	57,496	646	6,100	6,374	9,071	4,772	220,384
Georgia	12,836	6,280	2,248	85,481	10,080	415	932	361	125,229	1,015	20,178	3,549	3,780	16,882	290,851
Florida	875	551	2,457	15,580	1,297	1,776	5,440	2,881	19,038	126	6,255	3,886	5,914	4,256	70,312
South Atlantic	24,339	14,672	14,723	331,188	70,728	4,015	8,614	4,107	344,497	15,690	50,143	19,033	24,049	81,387	1,007,185
Ohio	2,081	2,988	3,839	1,383	167	619	9,698	5,134	21,912	3,687	877	340	164	0	52,838
Indiana	7,369	1,226	3,567	826	209	517	1,280	44,857	26,286	11,580	526	1,980	472	10	100,366
Illinois	10,756	726	1,568	475	0	3,280	5,586	583,574	34,393	12,315	2,410	9,431	1,908	13	666,423
Michigan	3,601	4,531	607	869	0	690	6,588	2,731	36,699	4,523	352	230	0	65	61,880
Wisconsin	13,415	216	440	121	40	568	2,886	6,624	24,053	1,100	478	628	0	167	50,736
East North Central	37,212	9,654	10,211	3,353	416	5,674	26,017	642,920	143,332	33,181	4,652	12,609	2,544	255	932,230
Minnesota	3,205	1,118	0	16	0	513	1,862	6,109	65,523	6,692	1,807	99	3	1,104	89,050
Iowa	9,624	167	860	60	0	107	1,064	25,757	56,231	5,047	11,386	176	1,192	0	113,622
Missouri	9,417	578	416	168	0	586	1,573	16,792	43,839	6,471	623	307	802	0	83,861
North Dakota	45	0	40	0	0	0	0	463	10,646	1,383	2	0	0	28	12,607
South Dakota	10	0	0	0	0	0	31	480	3,290	117	660	0	0	0	4,548
Nebraska	10,321	1,413	410	30	0	15	180	401	5,635	1,586	1,100	0	0	175	21,468
Kansas	6,408	2,020	140	0	0	369	203	3,021	28,199	13,892	707	46	0	3	54,708
West North Central	39,030	5,286	1,866	253	0	1,572	4,903	54,003	215,163	37,287	16,264	630	1,997	1,310	379,564
Kentucky	7,386	63	2,904	1,497	36	262	160	34,488	88,300	9,916	3,982	151	474	25	149,615
Tennessee	8,462	505	1,295	14,015	160	534	323	376	86,439	12,669	27,758	391	3,003	460	156,380
Alabama	18,650	5,131	228	83,400	558	357	172	380	91,701	2,273	117,891	1,464	1,654	486	324,055
Mississippi	60,416	8,564	13,988	73,832	14,043	10	0	1,745	50,580	2,728	143,943	2,389	2,266	25	374,529
East South Central	94,894	14,263	18,415	172,744	14,798	1,163	655	36,986	317,020	27,585	293,274	4,395	7,397	996	1,004,583
Arkansas	24,015	317	4,421	18,482	1,378	6	0	270	39,633	2,070	6,909	2,583	6,512	0	108,596
Louisiana	26,609	459	3,713	21,596	4,171	69	105	3,331	24,560	1,598	14,361	1,269	1,235	36	103,710
Oklahoma	789	241	70	145	0	74	363	29,257	15,592	0	774	17	8	60	47,390
Texas	15,722	938	966	1,394	114	330	709	4,399	177,044	2,315	21,782	246	93	11,349	237,401
West South Central	67,135	1,955	9,170	41,617	5,663	479	1,177	37,857	256,829	5,981	43,826	4,115	7,848	11,445	496,097
Montana	0	842	0	5	0	0	120	160	342	6,258	360	1	0	913	8,961
Idaho	2,446	3,456	0	130	0	0	177	0	24,551	12,896	2,010	305	0	2,777	48,748
Wyoming	0	700	0	0	0	0	0	0	1,731	2,149	400	0	0	2,700	7,680
Colorado	943	3,383	20	123	0	43	670	0	6,738	6,570	1,388	472	301	1,573	22,222
New Mexico	855	265	0	50	60	0	101	0	6,365	278	2,689	6	0	806	11,475
Arizona	7,452	1,967	2,638	2,255	5,414	17,532	3	40	15,460	867	8,296	83	51	5,169	68,217
Utah	1,022	1,741	0	16	0	200	143	150	5,778	2,893	1,360	26	0	150	13,479
Nevada	5	6	0	0	0	0	130	0	192	303	5	0	0	136	777
Mountain	12,723	12,360	2,658	2,579	5,474	17,775	1,344	350	61,155	32,214	16,498	893	352	12,224	178,579
Washington	4,555	6,970	127	1,555	1	933	1,896	0	16,220	1,319	7,430	1,904	368	7,729	50,997
Oregon	4,610	9,456	1,147	1,492	67	200	884	50	26,166	2,930	8,842	1,048	103	3,526	60,521
California	52,397	124,045	8,020	12,075	48,194	55,972	30,433	42	80,220	9,575	45,223	2,144	5,169	505,460	978,969
Pacific	61,562	140,471	9,294	15,122	48,262	57,105	33,213	92	122,606	13,824	61,495	5,096	5,630	516,715	1,090,487
Continental U. S.	342,306	200,640	73,835	597,188	146,183	99,830	103,096	777,357	1,844,837	166,051	492,594	50,183	52,808	625,618	5,572,526
Territories	5,041	48,123	233	292	418	0	0	70	2,460	0	7,062	6,546	1,902	186	72,333
Total	347,347	248,763	74,068	597,480	146,601	99,830	103,096	777,427	1,847,297	166,051	499,656	56,729	54,710	625,804	5,644,859
Proportion of Total Materials	6.2%	4.4%	1.3%	10.6%	2.6%	1.8%	1.8%	13.8%	32.7%	2.9%	8.9%	1.0%	1.0%	11.0%	100.0%

1/ Includes distribution by Government agencies. Exclusive of liming materials but includes gypsum. Includes materials sold for home mixing.

2/ Ammonia: anhydrous, 43,373, aqua, 4,747; ammonium nitrate solution, 12,234; calcium nitrate, 9,840; ammonium nitrate-limestone mixtures, 72,646; urea, 3,[illegible]; other, 271.

3/ Exclusive of farm manure.

4/ Dried blood, 1,092; compost, 535; fish scrap and meal, 2,532; seed meals: apricot, 10, castor pomace, 5,951, cottonseed, 9,588, cocoa, 54, linseed, 1,045, olive, 5, peanut hull, 11, soybean, 319, tung, 208; sewage, activated and other, 78,320; tankage: animal, 1,064, garbage, 177, process [illegible], 1,433; other, 755. Exclusive of cottonseed meal distributed through channels other than fertilizer manufacturers.

5/ Includes colloidal and soft phosphate.

6/ Ammonium phosphates: (11-48), 14,001, (16-20), 105,643; ammoniated superphosphate, 3,205; basic lime phosphate, 380; basic slag, 322,504; bone meal: raw, 6,684, steamed, 5,284; calcium meta-phosphate, 6,278; fused calcium magnesium phosphate, 3,147; fused tri-calcium phosphate, 24,512; phosphoric acid, 6,153; potash phosphate ash, 1,448; other, 417.

7/ Cottonhull ash, 1,831; manure salts (20-30%), 30,890; nitrate of soda-potash, 613; potassium carbonate, 5, nitrate, 290, sulfate, 7,593; sulfate of potash-magnesia, 4,712; tobacco stems, 1,218; wood ashes, 4,045; flue dust, 2,362; other, 153.

8/ Borax, 3,208; copper sulfate, 4,244; landplaster (gypsum), 573,520; magnesium sulfate, 356; manganese sulfate, 185; sulfur, 31,359; sulfuric acid, 5,238; zinc sulfate, 166; iron sulfate, 116; other, 7,413.

9/ Tonnage included with 18-21% superphosphate.

Fourth Annual Convention

American Plant Food Council

Mt. Washington Hotel, Bretton Woods, New Hampshire

THE advance program for the fourth annual convention of the American Plant Food Council called for talks by Rep. Harold D. Cooley, chairman of the House Agriculture Committee and other Government agricultural leaders; educators and leaders of National agricultural organizations.

As the program stood at press time, the meeting was to open informally on Sunday, June 19, with registration and various forms of recreation in the afternoon. A meeting of the Council's Board of Directors is scheduled for 8 p.m.

The convention proper was to begin at 10 a.m. Monday, with an address by Clifton A. Woodrum, A.P.F.C. president. Introduction of guests was to be made at this session, committees were to be appointed, and announcements made.

An agricultural panel was to discuss "Fertilizer, Farming and the Future" at 10:30, with Dr. Paul D. Sanders, Editor, *The Southern Planter*, moderator. Scheduled to appear on the panel are Dr. Robert F. Chandler, Jr., Director, Agricultural Experiment Station and Dean of the College of Agriculture, University of New Hampshire, Durham, N. H.; Dr. Ralph W. Cummings, Associate Director of the North Carolina Agricultural Experiment Station, N. C. State College, Raleigh, N. C.; Representative Charles B. Hoeven (Iowa), Member of the House Committee on Agriculture; Dr. W. H. Pierre, Head of Iowa State College Department of Agronomy, Ames, Ia.; and Dr. Robert M. Salter, Chief, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

The afternoon of Monday is left open for golf for men and appropriate events for the ladies present. Dancing is scheduled for 10 p.m.

Tuesday morning's schedule begins at 10 o'clock, with an address by Dr. Wm. I. Myers, Dean of Agriculture, State College of Agriculture, Cornell University. Following Dr. Myers on the program are two representatives of the National 4-H Club; Miss Rita Bott,

DR. ROBERT F. CHANDLER, JR.

HON. CHARLES B. HOEVEN

DR. PAUL D. SANDERS

June 19-22

1949

DR. W. I. MYERS

CLIFTON A. WOODRUM

Triadelphia, W. Virginia; and Francis Pressly, Stony Point, N. C. A business session follows, with reports of committees and election of new members to the Board, and the afternoon is devoted to recreational activities, according to the program. A cocktail party is on the agenda for 6:30 p.m.

The annual American Plant Food Council dinner is scheduled for Tuesday evening, with Rep. Harold D. Cooley speaker of the evening. Dancing begins at 10 p.m.

The final day's program consists of a meeting of the new board, adoption of the budget, appointment of the Council's Executive Committee, and an organization meeting of the Committee.

Arrangements for special trains to Bretton Woods and return to New York, were made by the A.P.F.C. The first was to leave Grand Central Station, New York on the evening of June 18; and the return train was to depart from Bretton Woods at about 8:30 Wednesday night.

Joseph A. Howell, executive vice-president of Virginia-Carolina Chemical Corp., Richmond, Va., is chairman of the convention committee. His group consists of C. B. Robertson, president, Robertson Chemical Corp., Norfolk, Va., and Fred J. Woods, vice-president, Gulf Fertilizer Co., Tampa, Florida.

The Hospitality Committee head is G. T. Cunningham, Armour Fertilizer Works, Atlanta, Ga. His committee members are: J. D. Stewart, Jr., Federal Chemical Corp., Louisville, Ky.; J. A. Woods, Jr., Potash Company of America, Raleigh, N. C.; Malcolm Hunter, Virginia-Carolina Chemical Corp., Richmond, Va. and F. B. Stephenson, Robertson Chemical Corp., Norfolk, Va.

The Golf Committee chairman is A. B. Baker, Jr., New York. Other members are: Charles Burroughs, Jr., Norfolk, Va.; Deane Gidney, New York; W. F. McLane, Tampa, Fla.; and John W. Ground, III, Joplin, Missouri.

RALPH W. CUMMINGS

DR. R. M. SALTER

DR. M. J. PIERRE

The Chief of FDA discusses

Insecticide Chemicals

THE purpose of this paper is to express the thinking of the Food and Drug Administration about the use and abuse of poisonous sprays in the production of foods. The matter will be regarded, of course, from the standpoint of the obligation of the Food and Drug Administration to protect the consumer through the enforcement of the Act.

The National Agricultural Chemicals Association is likewise committed to a policy of safeguarding the distribution and uses of insecticides, and one object of this paper is to help the Association in implementing such a program.

To state a few fundamentals at the outset, it should be remembered that the Food and Drug Administration recognizes that the use of insecticides is necessary both to bring many agricultural food crops to maturity in a condition suitable for human consumption and to protect many foods against insect depredations during manufacturing operations and storage.

It is also understood that by and large, insecticides are poisons. If they were not poisonous, they would be of no value as insecticides. Their toxicity varies only in degree.

It must be remembered, further, that the terms of the Federal Food, Drug, and Cosmetic Act do not preclude the use of insecticides, but they do make provisions to guarantee that when they must be used, consumer safety shall be assured.

In drafting this law, Congress obviously had in mind that under modern conditions human beings are exposed to traces of toxic substances from many sources. The lawmakers recognized that the sum total of our intake of these small quantities of toxic substances may may be hazardous unless appropriate steps are taken to safeguard the public in every possible way.

Thus, when they came to write legislation to establish the purity of foods, it was held that a food is adulterated if it bears or contains *any* poisonous or deleterious substance which may render it injurious to health, regardless of whether that substance is a natural component of the food or is added. They went further and stated that any poisonous or deleterious substances *added* to a food should be considered unsafe, regardless of the amount added. It was recognized, however, that if this provision were carried out strictly, it would outlaw the use of necessary insecticides and would curtail food production severely. So an exception was made in cases where the use of a poisonous substance is required in production or cannot be avoided by good manufacturing practice. In such cases, the Administrator was directed to set safe tolerance regulations which had the force and effect of law. The Administrator was instructed further to take into account not only the extent to which the use of the poison is required, but also to consider the other ways in which consumers are exposed to the same or other poisonous substances.

That provision of the law naturally imposed heavy responsibility on the Food and Drug Administration . . . an obligation which it has not yet been fully able to meet. The law was passed in 1938, and through the war years it was impossible to hold hearings necessary to establish tolerances. However, the F. & D.A. did set up a tolerance for fluorides on apples and pears in 1944, but that regulation was invalidated by a decision of the Ninth Circuit Court of Appeals.

Preparations were begun following the war, to reopen the hearings and to set up tolerances for a number of insecticides which were then coming into extensive use. This posed a difficult situation, since during the war a large number of new and very potent insecticides had been developed. Little was known about their toxicity either to the user or to the person who consumed the finished food product. In several cases, methods were lacking for accurate estimation of residual spray left on or absorbed by the food product, and it was not known whether the residues remained intact, whether they were affected by weathering, if they might be removed by washing, or if they were absorbed into the plant structure and therefore could not be removed. Too little was known about many of these insecticides to warrant hearings and the establishment of safe tolerances.

Toxicological Viewpoint

TOXICOLOGISTS view their subject from two standpoints: first, the possibility of acute poisoning; and second, the possibility of chronic poisoning. The former does not present problems of particularly serious nature, since such poisoning occurs only through negligence. But what the toxicologist *is* worried about, is chronic poisoning which results from long-time consumption of minute amounts of

by

Dr. Paul B. Dunbar*

Commissioner, Food and Drug Administration
Federal Security Agency,
Washington, D. C.

a poison which build up in the system to produce eventually, a serious physical disturbance. Arsenic and lead have been known to produce cumulative poisoning, but knowledge is just beginning to be acquired about the cumulative toxicity of some of the newer materials.

To illustrate the general problem of all insecticides, consider the case of DDT. It is a tremendously useful pesticide, and its application during the late war undoubtedly saved the lives of many thousands of boys who otherwise would have succumbed to typhus and malaria. There was no question during those years about whether or not DDT was a poison. It was proved to be that in the Public Health Service laboratories and in the laboratories of the Food and Drug Administration. But the material was regarded as a reasonably calculated military risk; presenting less danger than allowing the boys to be exposed to typhus and malaria. In reaching this conclusion, the toxicologists believed that, while exposure to DDT would be fairly heavy, it would not be a long-continued exposure, and that the risks of cumulative poisoning would therefore be low.

Since the war, DDT has retained its popularity as an extremely efficient insecticide. But by the same token, there is an increasing danger of exposure of the general public to small continued intakes of DDT from many sources and for long periods of time; with resultant hazards of cumulative effect. This is particularly true since the public has come to believe that the material is not poisonous.

Naturally, no one knows how serious this hazard is in terms of human damage. However, this much is known: that experimental rats fed rations containing very small amounts of DDT, amounts of but one part per million or thereabouts, will in the course of time, and well before the end of a normal rat lifetime, store DDT in the fat. With five parts per million it will develop liver damage that is minimal but characteristic; that female dogs exposed to cumulative effects of DDT secrete DDT in the milk; further, that mother rats fed 50 parts per million, or more, in their diet produce smaller weanling rats and fewer survivals to a litter than control animals. Similar experiments cannot be performed on babies. We cannot exactly translate the results of rat experiments into terms of human effects. Certainly in any study of possible toxicity, if we know that one species of animal is affected, there is only one course to follow and that is to play safe and assume that the same results would follow if human animals could be used for experimentation.

While DDT is an extremely useful insecticide, it is apparent that the public has been more or less educated to consider it completely harmless. That undoubtedly has led to careless use by consumers in the household, and by food producers. A pathetic letter from a lady in Georgia states that she had a small house and garden in a country area, and that nearby farms were being literally deluged with poisonous sprays. To quote her—"Our home is in a smother of poisons from surrounding farms from early spring until late autumn. Our continued illness, particularly my own during this time, has occurred after being exposed to these poison dusts and sprays." She goes on for several pages to recite the ills which she and her family have suffered. She sincerely believes, and perhaps correctly, that these ills are attributable, at least in part, to these continued exposures. Apparently her doctor believes so too.

Now, as was said at the outset, poisonous sprays are a necessary and a valuable part of the program of producing sound and edible food supplies, and of combatting harmful and destructive insect pests. But the time has come when discretion and discrimination must be employed in the use of poisons, and the ever present objective must be the protection of human beings from undue exposure.

Until a few months ago information was not available which we now have about the cumulative effect of small doses of DDT. Such experiments require several years. Only recently have the experiments of the Bureau of Entomology and Plant Quarantine been carried to a point where it was necessary for them to say that if dairy cows are fed silage bearing DDT, if dairy cows are sprayed with DDT, or even if DDT is used in dairy barns, the milk from those cattle will contain DDT. Prior to that discovery it was the F. & D. A.'s view that, with proper precautions to protect food from contamination, DDT was a useful and safe insecticide to use in connection with food production of every type. However when later inquiry was made of the F. & D. A. whether DDT was a safe substance for use in dairy practice there was only one answer to make. Milk is a most important and universal food. . . . the principal food of many babies from almost the day of their birth. It is an important food not only of children, but important as an item of the diet throughout one's lifetime. Its purity must be safeguarded in every possible way. The Food and Drug Administration will not and cannot set up a tolerance for DDT

* From paper presented at National Agricultural Chemicals Association meeting, Rye, New York, May 5, 1949.

in milk. It is plain common sense that dairy practice shall be so conducted as to protect the milk supply. Fortunately the Bureau of Entomology and Plant Quarantine was ready to suggest alternative and far less objectionable substitutes for DDT. I cannot say too much in praise of the action of that Bureau in promptly adjusting its spray recommendations to fit the new situation. There is no ground for hysteria about our milk supply.

The dairy industry will certainly abandon its practice of using DDT in favor of some less objectionable substance. After all, in many areas of the country the fly population is no problem during the winter months, and in summer the cattle are in pasture, unexposed to DDT. The impression that a vast number of our population are consuming harmful quantities of DDT in milk is unfounded. Our spot checks of market milk throughout the United States justify that statement.

But since the risk exists, the industry is advised to back up all efforts to encourage the *discriminating* use of insecticides.

A paper entitled "Pharmacological Considerations of Insecticides" was delivered by Dr. Arnold J. Lehman, Chief of our Division of Pharmacology, at the San Francisco meeting of the American Chemical Society in April. He discussed the results, not only of his own investigations, but also other scientific studies; and then listed those insecticides on which sufficient scientific evidence has now been accumulated to warrant belief that hearings can be held under the Federal Food, Drug, and Cosmetic Act, and safe tolerances set up. His suggestions are *not* tolerances. Tolerances can be set up only in legal form after hearings.

They are his ideas as to the location of the danger threshold. I am not going to read them all, but I do want to mention his views about DDT. He says that in his judgment the danger point should be under one part per million if a large part of the food consumed is contaminated, but that five parts per million approaches that point if DDT is found only in single items. By that he means that if it can be shown, for example, that the spray schedules can be so controlled by entomologists and manufacturers that the harvested crop of most fruits and vegetables will contain no DDT; but that, perhaps, apples and pears may contain some unavoidable residues, then it may be permissible to set up a legal limit of five parts per million for apples and pears. On the other hand, if it turns out that a great many other foods, in order to be brought to maturity without being destroyed or badly damaged by insect infestation must contain some DDT, then a wider range of products must be provided with tolerances. In that case, since the consumer intake would come from so many sources, a tolerance as low as one ppm might be the maximum permissible. The Food and Drug Administration will never be able to, nor should it, set up a DDT tolerance for *every* variety of food product. Certainly milk is one product where we will not do so. In general, baby foods of every type are in this category. Other foods which are less continually and less universally used may properly be permitted to be sold under a tolerance which quite possibly may not be as large as five parts per million but should be sufficiently liberal to permit effective but discriminating spraying.

One can be confident that, with determination on the part of insecticide manufacturers to control their labels and distribution to protect the consumer, and with the able guidance of the entomologists in the Department of Agriculture and in the various State organizations, it will be possible to work out a program that will both protect the food supply and also guarantee consumer protection. Such a program should call for avoidance of the use of insecticides in food production unless a real need for such use exists. It should obviously envisage the abandonment for food production of any type of insecticide which is too poisonous for safe use on foods.

Moral obligation rests upon manufacturers to work toward insecticidal products more effective against insects, but less harmful to man, and less hazardous on foods. Industry should set up index of residues to determine amounts in food as well as how much is on them, Dr. Dunbar declares.

There is a moral obligation upon every manufacturer to work toward the synthesis and economical manufacture of pesticides which may combine low human toxicity with high insecticidal value. A corrollary obligation would appear to include research on methods of chemical analysis of new pesticides to afford an accurate index of residues. This index should reveal not only residues on foods, but *in* them, in all cases where it is necessary to use a particular pesticide.

Such methods will be invaluable to pharmacologists of both government and industry in estimating the effects of toxic materials on human beings. There are heartening indications that a number of the pesticide manufacturers are fully conscious of both of these obligations and are conducting research which may not seem to be productive of immediate profits, but which will pay tangible dividends in the long run. Such concerns are to be congratulated, and the best advice to each of the others is to say, "Go thou and do likewise".

National FERTILIZER Association

Greenbrier Hotel
White Sulphur Springs, W. Va.
June 13–15, 1949

ACCORDING to advance notices issued at press time, the 24th annual Convention of the National Fertilizer Association opens at 10 a.m. Monday, June 13, with a meeting of the Board of Directors. The Plant Food Research Committee was to hold an open session at the Greenbrier at the same time.

The afternoon of Monday is set aside for a pasture tour of the area around White Sulphur Springs, under the sponsorship of the Plant Food Research Committee. Everyone attending the convention was invited to participate in the tour.

Chairman of the N.F.A. Board of Directors, Ray L. King, Valdosta, Ga., opens the first general meeting of the convention on Tuesday morning at 10. Mr. King acts as chairman of the morning session.

Louis Bromfield, Lucas, Ohio, author of *Malabar Farm* and other agricultural books is scheduled to appear on the Tuesday morning program, as is Charles H. Mahoney, director of the Raw Products Research Bureau, National Canners' Association, Washington, D. C.

George N. Hoffer, manager of the Midwest office of the American Potash Institute is the final speaker scheduled to appear on the program preceding an election of members to the N.F.A. Board of Directors.

One of the annual events of the N.F.A. convention is the annual banquet scheduled for Tuesday evening at 7:30. A program of entertainment is on the agenda, with the presentation of prizes to convention attendants.

Dr. Russell Coleman, president of the National Fertilizer Association, Washington, opens the program on Wednesday, June 15, with an address. He is followed by Dexter M. Keezer. Mr. Keezer, an economist, is from McGraw-Hill publishing Co., New York. A talk by Kent Leavitt, president of the National Association of Soil Conservation Districts completes the speaking portion of the morning program.

Following the appearance of Messrs. Coleman, Keezer and Leavitt, a business session is scheduled, followed by a memorial service. The program calls for the regular annual meeting of the new Board of Directors immediately following the business session. The latter includes an election of officers.

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The Listening Post

Preventive Action Urged for Disease Control

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

INCIDENCE of blue mold up to the time of this summary has provided a double object lesson. First, it has demonstrated again the certainty of control by recommended materials used as recommended. Second, it has made clear the danger of basing one's attitude toward the urgency and thoroughness of control measures this year, upon the experience of last season. Such a policy has been manifested in widespread neglect of control, delay in starting it, or improper use of control chemicals. Details are brought out in the report which follows.

Of the other diseases included in the Warning Service, late blight, on the whole, has so far not been especially serious although reports at the time of writing indicate that it was just beginning to assume greater importance.

Cucurbit downy mildew had not yet appeared outside of Florida where it was causing some trouble.

Tobacco Blue Mold

BLUE mold is "raging" in the worst attack in ten years in North and South Carolina and, if weather continues to favor its activity there and northward, 1949 may be long remembered for this disease. Several circumstances contribute to this epidemic. First, is its very early appearance (Figure 1 and Table 1). Probably of equal importance are the favorable weather conditions and the indifference of growers to control measures because of the comparatively slight occurrence last year. This attitude, according to T. W. Graham, ". . . apparently gave growers a false sense of security." He goes on with a further statement that seems to be as true of other sections as of South Carolina: "Growers in this area know from previous experience that only a sustained treating program is effective under epidemic conditions, yet few have carried out such a program. It seems to me that the best efforts of extension pathologists are required year by year to keep the farmers on an even keel with regard to the control of blue mold. Tobacco growers seem to shift from a state of excitement to one of lethargy, depending upon the severity of the disease the preceding season."

Not only indifference, but also misconception, seems to affect the grower's attitude toward control. Perhaps this year will have an educational effect. As pointed out by various keymen, growers possess wholly inadequate ideas concerning both the factors involved in infection and spread of the disease and the actual use of control materials. As examples of the first category, growers in sections where plants advance too rapidly before setting time occasionally attempt to inoculate the beds or deliberately withhold control to keep the plants back. This points to a lack of understanding, or at least ignorance of the risk they run of losing their plants if conditions should suddenly become favorable for the disease. Some growers occasionally resort to seeding beds a month or so ahead of the normal time ". . . in the unfounded hope," as J. G. Gaines puts it, "that early plants might escape severe disease damage." On the contrary, however, this practice "almost invariably results in unseasonal, early, and severe mold at a time when the disease is much more destructive than it would be later in the season." It also results in an ideal situation for build-up of inoculum and spread of infection.

Table 1. Dates of first appearances of Tobacco Downy Mildew in the plant bed, 1931-1949.

State	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
Fla.	May 8	Feb. 23	Feb. 20			Mar. 30	Feb. 12	Feb. 7	Feb.9-10	
Ga.	Apr. 12	Jan. 25	Feb. 20		Mar. 7	Feb.	Jan. 25	Feb. 2	Feb. 4	
S. C.		Mar. 30	Mar. 21	Apr. 3	Apr.		Feb. 25	Mar. 14		
N. C.	Apr. 27	Feb. 23	Mar. 21	Mar. 15	Apr. 1		Mar. 10	Mar.7-8	Mar. 8	
Va.	May 24	June 8	Apr. 24		May 13		Apr. 20	Apr. 29	Apr. 10	
Tenn.			May 5		May 3		Apr. 30	Apr. 19		
Md.	May	May 31	May 16	May 29		May 11	May 10	Apr. 21	May 1	
Ky.						June 8	May 13	Apr. 29	May 7	May 15
Pa.		June 15	May 14							About May 12
Conn.							May 25			May 23
Mass.							June 10*	May 14	May 22	May 23
Ind.							June 13			
La.	Mar. 20*								May 23	
Ohio								June 7+		
Wisc.										
Canada										

State	1941	1942	1943	1944	1945	1946	1947	1948	1949	Earliest appearance -18 yrs.	Yr.
Fla.							Jan. 30	Feb. 23	Feb. 11	Jan. 30	- 1947
Ga.	Feb. 10		Early Feb.	Feb. 23*	Feb. 16		Jan. 28	Feb. 4	Jan. 11	Jan. 11	- 1949
S. C.	Apr. 19				Mar. 14*	Mar. 20*	Mar. 10	Mar. 15	Feb. 28	Feb. 25	- 1937
N. C.							Mar. 3	Mar. 23	Mar. 4	Feb. 23	- 1934
Va.	May 5*	May 6	Apr. 27	Apr. 24		Apr. 3		Apr.4-5	Mar. 25	Mar. 25	- 1949
Tenn.				May 12*			May 3	Apr. 30	Apr. 25	Apr. 19	- 1938
Md.		May 4		May 4		Apr. 12	May 5	Apr. 23	Apr. 16	Apr. 12	- 1946
Ky.					Apr. 28	Apr. 17	May 8-10	Apr. 29		Apr. 17	- 1946
Pa.					May 22-25		May 20*	May 17-21		May 12*	- 1940
Conn.						May 1	June 3	May 17-21		May 1	- 1946
Mass.	May 16	May 5-7	May 24-28				May 16	May 17-21		May 5-7	- 1942
Ind.											
La.					June 1					May 23	- 1939
Ohio										June 19	- 1947
Wisc.							June 19+				
Canada							May 11	May 17-21		May 11	- 1947

* Approximate date. + First Appearance * Field plants

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Possibly fitting into categories of both indifference and misconception, is the contention of North Carolina growers that "Fermate" makes plants "too tender." Probably the main explanation for the tender plants, according to H. R. Garriss, at least in the area where this opinion is most strongly expressed, is an unnecessarily high rate of seeding, which, with protection from blue mold, results in very thick stands. Also, in many cases, over-fertilization is a factor. It is believed that since effective control measures for blue mold are now available, growers who plant too thickly or too early would benefit by adopting dates and rates of seeding followed before 1932.

H. R. Garriss reports various other grower opinions about control that are probably typical. Control has been excellent in North Carolina this year when "Dithane Z-78" or "Fermate" were used according to recommendations. Nevertheless, some growers who did not decide to treat their beds until after blue mold appeared, are convinced that the recommended materials are inefficient because they did not "check" the disease as growers thought they should. "This thought exists," continues this reporter, "in spite of all the teaching that materials are primarily preventives. It is my opinion that with our present-day spray and dust treatments, any mention of curative or 'checking' qualities is dangerous propaganda for the tobacco grower to have access to. Such information is conducive to starting treatments after blue mold makes its appearance." He concludes that although considerable benefit often results from starting treatment after the disease appears, " it is a risky practice to suggest."

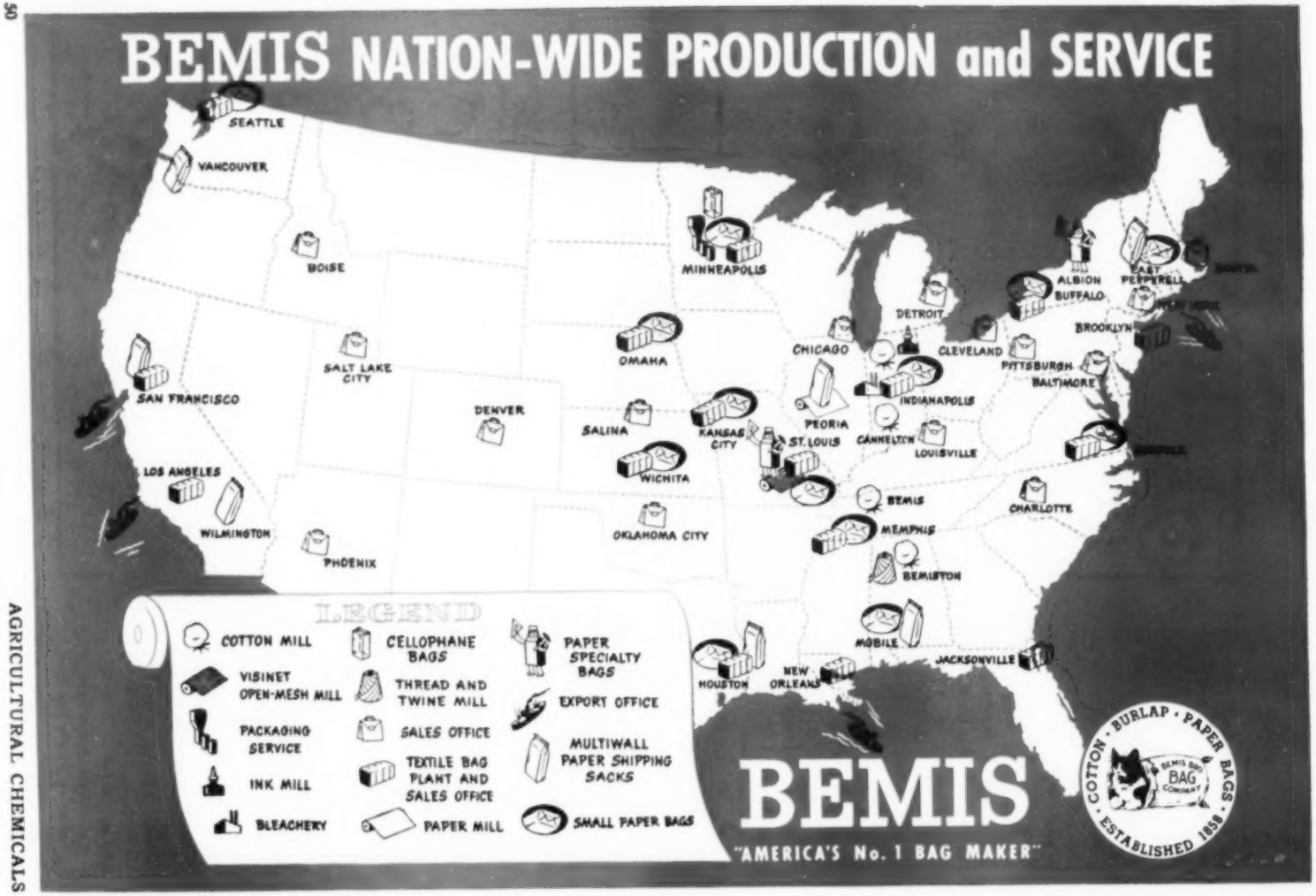
The addition of injurious substances to "Fermate" caused trouble in Georgia, reported by J. G. Gaines as follows: "Considerable and widespread commercial damage to tobacco plants has been re-

FIGURE 1

Distribution and Severity of Tobacco Blue Mold. Warning letters Nos. 1–15, inclusive. January 19 to April 26, 1949.

FIGURE 2

Distribution and Severity of Potato and Tomato Late Blight. Warning letters Nos. 1–15, inclusive. January 19 to April 26, 1949.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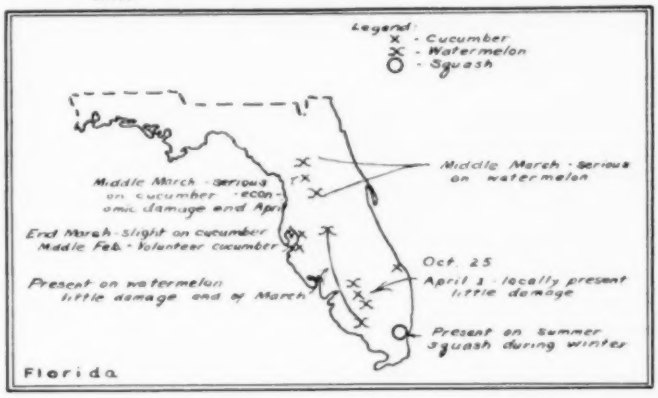
ported in some localities from the use of "Fermate" dust made up with diluents other than talc or pyrophyllite, or where undisclosed clay stickers were used in mixing the dust. A preliminary test with one brand of this dust resulted in plant damage ranging from severe leaf burning to 80 percent plant kill from two heavy applications such as growers often use. Normal applications caused definite leaf injury. On some farms this dust damage has exceeded blue mold damage."

A new product, active ingredient of which was stated to be bismuth calcium oxide 70%, "made its appearance and disappearance" in North Carolina, Mr. Garriss reports. It was "claimed to be effective as a preventive or cure when used as a dust or spray according to the manufacturer's directions." He reported further that although a newspaper article stated that the product had been widely acclaimed in Georgia and Florida where successful experiments had been conducted in the tobacco-growing areas, contacts with pathologists in these areas failed to reveal any knowledge of this product. Contacts with the manufacturers have failed to produce data to justify the claims made. The product has since been removed from the market because of improper labelling and will not be registered for sale unless the material proves to be of merit through adequate testing.

Itinerary of the disease so far this year is easily followed from the map (Figure 1). It will be interesting to watch its further progress and compare time of appearance with dates listed in Table 1 for other years.

In Georgia, because of the very early appearance and the exceptional number of early-seeded beds, maximum damage was expected but did not materialize. The disease did become widespread in Georgia tobacco areas, but temperatures were too high for severe damage in late January and throughout

FIGURE 3
Distribution and Severity of Cucurbit Downy Mildew. Warning letters Nos. 1–15, inclusive, January 19 to April 26, 1949.



February. Seed-bed activity in Florida also was not severe.

The situation in the Carolinas, however, has been quite different and expectations of a severe epidemic have been fully realized, as already stated. Plants had to be brought in from outside the State to supply many South Carolina communities, while delayed planting and uneven crops were in prospect for many growers. In North Carolina, up to the middle of April, it was not yet certain whether a general plant shortage would result, but Garriss reports a shortage on some farms in the eastern part of the State, which means movement of plants from one locality to another, a practice which is strongly discouraged because of the danger of introducing the black shank and Granville wilt organisms into new locations.

Up to the end of April, indications in Virginia, Maryland, and Tennessee pointed to development similar to that in the Carolinas. Hope has been expressed that farmers in these areas may take warning from the experience of Carolina growers and become more interested in controlling the disease.

Field Outbreak in Florida

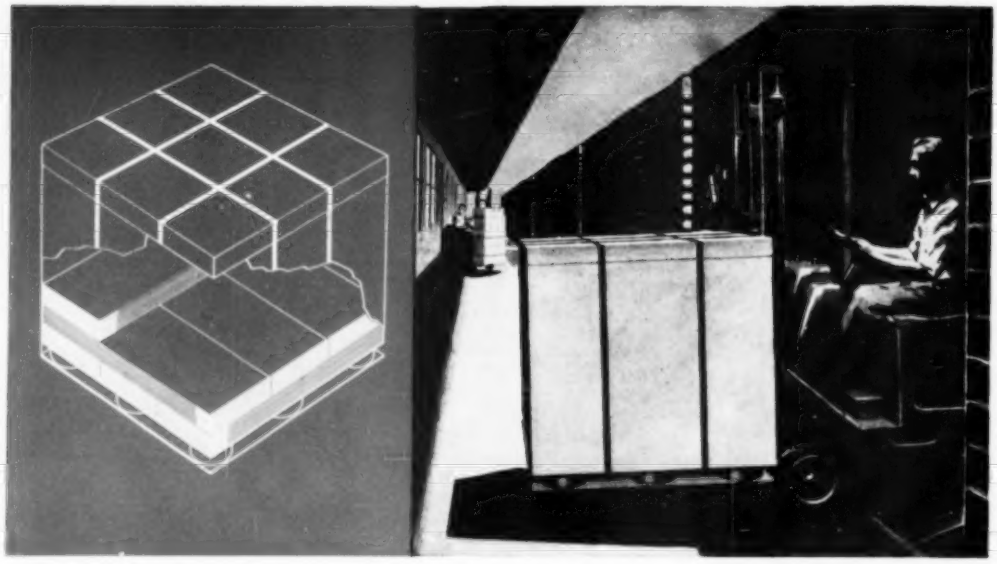
W. B. TISDALE reports that during April, weather conditions were favorable for blue mold. "As a result, the most severe epidemic of blue mold ever to occur, has developed in the fields of flue-cured tobacco [north-central Florida]. Specimens brought in from some fields have shown from four to seven of the lowest leaves completely ruined. Furthermore, many fields are showing flower 'buttons' so that more than half the crop is ruined. Since there are very few plants in the beds that are suitable for resetting, some farmers are topping the plants in the field low to encourage a sucker crop."

He states that the disease is reported to be causing field damage in the Gadsden County cigar-wrapper area also.

Downy Mildew in N. Carolina

GARRISS reports that "On April 5, L. W Nielsen collected seedlings of eggplant and tomato affected with a downy mildew from a plant bed near Rowland (Robeson County). The plant bed containing eggplant, pepper, and tomato seedlings was located about 300 yards from a tobacco bed in which blue mold was active. Examinations made by D. E. Ellis revealed sporulation of a *Peronospora*, presumably *P. tabacina*, on affected plants." A visit to this

Turn to page 93



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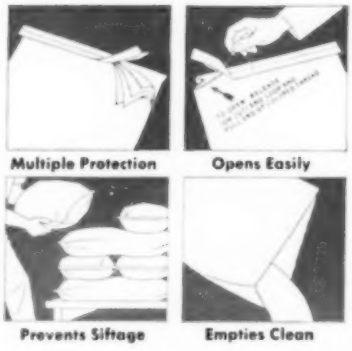

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Insect Conditions Late April, Early May

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Haeussler is in charge of Insect Pest Survey and Information, Agric. Research Adm., B. E. & P. Q., U.S.D.A. His observations are based on latest reports from collaborators in the department's country-wide pest surveys.

By G. J. Haeussler

PUPATION of overwintered codling moth larvae was well under way in many apple growing areas by the middle of April. By the end of the month the moths were reported emerging in Virginia, Georgia, Kentucky, and the Yakima Valley of Washington. Emergence was under way in Delaware, Ohio, southern Indiana and southern Illinois by the first week of May. It had started in the Hudson Valley of New York, in New Jersey and in Kansas by the middle of that month. Codling moth eggs began to hatch in western Maryland toward the middle of May.

Eggs of the red-banded leaf roller had begun to hatch by the end of April in southern Indiana and in Virginia. By May 2 the hatch was about 50 percent complete in southern Indiana. Eggs began hatching in Maryland, West Virginia, New Jersey, and the Hudson Valley of New York during the first week of May. By the middle of that month this insect was reported as being more abundant than ever before from west-central Indiana southward to Henderson, Kentucky.

Adults of the plum curculio were emerging from hibernation and being found on peach trees during the last half of April in most areas where this pest occurs. Eggs and feeding punctures were found in peaches, apples, cherries, and plums in southern New Jersey around the first of May. The curculios had begun to lay eggs in Ohio by the second week of May and egg laying had reached a peak by that time in Missouri. The peak of emergence of curculio larvae from peach drops occurred at Fort Valley, Georgia, on May 7, which was 15 days later than last year and 1 day earlier than in 1947.

Oriental fruit moths began to emerge during the last half of April in many areas, including New York, Ohio, Indiana, and the Yakima Valley of Washington. Larvae were reported infesting twigs during the first half of May in the Atlantic Coast states from New York to South Carolina, and also in Tennessee, Indiana, and Illinois. No eggs or infested twigs had been found in the Yakima area of Washington by the middle of May.

Development of the European red mite in orchard areas appeared to be generally slow during the last half of April. This pest increased in abundance during the first half of May in some areas, including New Jersey, Maryland, Virginia, and West Virginia.

Populations of the Mexican bean beetle ranged from light to moderate throughout the South during the last half of April and first half of May. The bean leaf beetle was abundant and causing damage to beans during early May in eastern Virginia, South Carolina, and Tennessee. Lighter infestations were reported from other parts of the South. Toward the middle of May, heavy infestations of a spider mite, believed to be the two-spotted spider mite, occurred on beans in South Carolina. Cutworms were damaging beans in Virginia, and the seed-corn maggot was injuring that crop in northwestern Tennessee and California. The sugar beet wireworm was numerous in some bean fields of Ventura County, California, and light populations of the serpentine leaf miner, the potato leafhopper, and the lesser cornstalk borer were present on beans in Florida.

Cabbage caterpillar populations were generally light to moderate on cole crops in all southern areas from the middle of April to the middle of May. Shortly after mid-April severe local damage to kale from the cabbage aphid was reported from parts of Eastern Virginia. Moderate to heavy aphid infestations on cole crops prevailed in California during late April and early May. Elsewhere, they appeared to be light to moderate except in South Carolina where they were reported as abundant in some fields towards the end of April. At that time the onion thrips, flea beetles, and springtails were infesting spring crucifers in Virginia. Toward the middle of May, egg-laying of the cabbage maggot was unusually heavy in New York and this pest occurred in damaging infestations on broccoli and cabbage in Maryland and on Brussels sprouts and turnips in northern California. The harlequin bug was numerous on turnips in Georgia and present in fewer numbers on turnips and broccoli in Tennessee. The cabbage seedpod weevil was very abundant on rape in northern Idaho and on other crucifers in northern California during the first half of May. Heavy flea beetle infestations also occurred at that time on crucifers in parts of Idaho and in central Washington.

The onion thrips was on the increase about the middle of April and causing serious damage to onions in parts of Virginia, South Carolina, Georgia, Mississippi and Louisiana. This pest continued in

destructive numbers into the first half of May in several areas, including Virginia, South Carolina, Tennessee, Louisiana, and California.

Early in May, the asparagus beetle caused serious damage to that crop in New Jersey, Delaware, Virginia, Georgia, and Idaho. Lighter infestations were reported from Ohio. The Colorado potato beetle was on the increase throughout the East and in Tennessee toward the middle of May.

Spittlebugs were numerous on strawberry in Maryland during early May, the two-spotted spider mite damaged this crop in Virginia, southern California, and central Washington, and the strawberry whitefly was numerous in the latter area.

A heavy early season infestation of the pea aphid was developing on alfalfa in upstate New York during the first half of May. Infestations were abundant at that time on peas in parts of New Jersey, Delaware, Maryland, Virginia, North Carolina, Tennessee, and Ohio. A light to moderate infestation was reported in Wisconsin on alfalfa and clover. A light but slowly increasing pea aphid population on alfalfa was reported during late April and early May in the palouse district of Idaho-Washington. In the Blue Mountain district of Washington-Oregon aphid populations on alfalfa have been considerably lower than in previous years. Pea planting operations there were practically completed by the middle of May and the movement of the pea aphid from alfalfa to peas was expected to occur most any time. This aphid was increasing on legumes in central Washington toward mid-May.

Light but widespread infestations of aphids were reported during the last half of April on tobacco in plant beds in parts of North Carolina, South Carolina, Georgia, and Florida. By the middle of May, there was a widespread infestation of aphids on tobacco in South Carolina and Georgia, ranging from light to heavy in various fields, but increasing in intensity. By that time intensive insecticide applications had controlled aphids on shade-grown tobacco in Florida, but the infestation on flue-cured tobacco was general there and some fields of this type were heavily infested. Aphids appeared in tobacco plant beds in Tennessee toward the middle of May. At the same time, flea beetles were damaging tobacco in plant beds in Maryland, newly set plants in Virginia, and there was a moderate infestation on tobacco in Tennessee. Newly-set tobacco in the Oxford district of North Carolina was being injured by the vegetable weevil.

Experiment Station Bulletins

Insect Control on Livestock

The Extension Service of the State College of Washington, Pullman, Wash., has recently issued Extension Bulletin No. 384 titled "Solid Comfort for Your Livestock." A program is outlined for the control of insect pests on livestock, advising on what insecticides to use, when to treat and what application equipment to use.

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"TCA" Tests Reported

Oklahoma Agricultural Experiment Station, Stillwater, Okla., has just issued a bulletin (Mimeo. Cir. M-180) reporting experiments with "TCA" for control of Bermuda and Johnson grass. Results were variable, depending upon the weather, the report says. A complete table of dosages and results with the two weeds is presented. Copies are available upon request.

•

NFA Offers Forage Booklet

"Protein Through Forage" is the title of pamphlet No. 150 recently published by the National Fertilizer Association, Washington, D. C. The booklet discusses thoroughly the grassland movement in the U.S., and is keyed to help stimulate further fertilization of large pasture areas in the west and south in particular. A chart of recommendations for late fall and winter grazing crops is presented, to be of help to agriculturalists of various regions and on different soil types.

The booklet is available from the National Fertilizer Association, 616 Investment Building, Washington 5, D. C.

•

Dept. of Agri. Bulletins

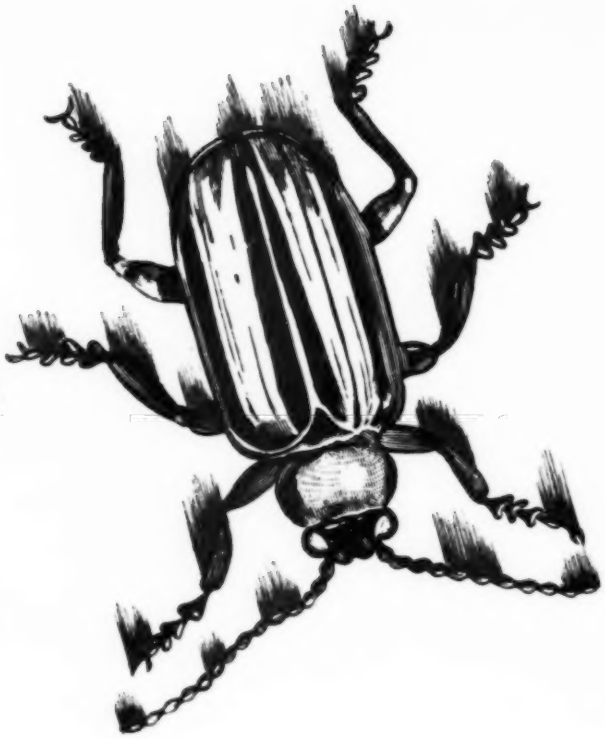
The U.S.D.A. has recently released bulletin No. 2004, "Controlling the Japanese Beetle." This bulletin gives directions for control of this pest by DDT. It also lists other control methods and summarizes information on the distribution, seasonal history and natural factors influencing the abundance of the beetle. The bulletin supersedes F-1856. Price is 15¢.

The "European Corn Borer Location on the Corn Plant as Related to Insecticidal Control," bulletin No. T-976, is also offered for 10¢ by the U.S.D.A. This 20 page bulletin, written by C. H. Batchelder, B.E.P.Q., is a report of a study in a field of sweet corn for the successful application of insecticides for the control of European corn borer.

•

Insecticide Action Described

"The Mode of Action of Organic Insecticides" is the title of a comprehensive review by Dr. Robert L. Metcalf, University of California Citrus Experiment Station, Riverside, Calif., published by the Chemical-Biological Coordination Center, National Research Council, 2101 Constitution Ave., N.W., Washington, D. C.



MARLATE® has "cuke" beetle on the *run!*

UP TO NOW, "cuke" beetles have had cucurbit growers on the run. Either they were eternally dusting with a short-lived, mild insecticide . . . or they resorted to a longer-lasting chemical that burned and stunted the vines of sensitive melons, squash and cucumbers.

Today that is changed. Now growers can control most insects on sensitive crops like cucurbits and tomatoes . . . now they can get control all season long with only a few applications . . . and now there is no worry about toxicity to the plants. The new product with all these desirable properties is Du Pont "Marlate" methoxychlor insecticide.

"Marlate" has all these outstanding advantages:

Highly effective as an insect killer.

Exceptional safety due to low toxicity to sensitive crops and to warm-blooded animals.

Long-lasting: One application is usually effective for several weeks.

Many uses: "Marlate" is ideal as an insecticide on most vegetables and forage crops, on many fruits, and as a livestock spray.

"Marlate" methoxychlor is one of many outstanding products of Du Pont research. You can get full information on it and other Du Pont chemicals for the farm from your local Du Pont technical service representative. Or write to Du Pont, Grasselli Chemicals Department, Wilmington 98, Delaware.

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

DU PONT CHEMICALS FOR THE FARM INCLUDE:

Fungicides: **PARZATE® (Liquid and Dry), FERMATE®, ZERLATE®, Copper-A (Fixed Copper), SULFORON® and SULFORON®-X Wettable Sulfurs—*Insecticides:* DEENATE® DDT, MARLATE® (Methoxychlor), CHLORONE® (Benzene Hexachloride), KRENITE® Dinitro Spray—*Weed Killers:* AMMATE®, 2,4-D, TCA and Dinitro Weed Killers—Also: Du Pont Cotton Dusts, Du Pont Spreader Sticker, PARMONE® Fruit Drop Inhibitor and many others.**

REG. U. S. PAT. OFF.

[On all chemicals always follow directions for application. Where warning or caution statements on use of the product are given, read them carefully.]

Tune in Du Pont "CAVALCADE OF AMERICA"—*Monday Nights, NBC Network*

Technical Briefs

Fertilizer vs Plant Disease

In the March 5, 1949, issue of the Massachusetts Commercial Vegetable Grower Leaflet, Professor C. L. Thomson, Extension Specialist in Vegetable Gardening, comments on plant nutrition as follows: "It is well known that the health, vigor, and nutritional level of at least some crop plants have a direct bearing on their susceptibility or resistance to certain fungus and bacterial diseases. Insufficient potash and too much nitrogen are frequently associated with marked susceptibility to certain diseases." He points out that, "Plant pathologists in Connecticut grew tomato plants at three different levels of nutrition, by varying the amount of a complete fertilizing ration, and inoculating the plants with the organism of the Fusarium wilt disease. The plants under the moderate or so-called X level developed severe disease, those at 0.1X level developed only a small amount of disease, while those with 10X nutrition level showed no symptoms at all."—*From Potash News Letter, May, 1949.*

Synthesis of Insecticidal Esters of Pyrethrin Type

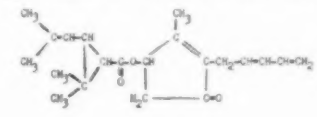
By Milton S. Schechter, Nathan Green and F. B. La Forge

Bureau of Entomology and Plant Quarantine,
Agricultural Research Administration
U. S. Department of Agriculture

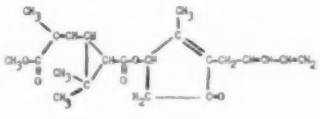
THE synthesis of pyrethrin-like esters almost identical in structure with the insecticidal principles in natural pyrethrum has recently been announced (1). This development culminates 15 years of investigation of the chemistry of pyrethrum by chemists in the Bureau of Entomology and Plant Quarantine.

The work of Staudinger and Ruzicka (2) published in 1924 furnished the first clear conception of the general nature of the insecticidal constituents of pyrethrum flowers. The active principles, designated as pyrethrins I and II, were shown to be esters of chrysanthemum monocarboxylic acid and chrysanthemum dicarboxylic acid monomethyl ester respectively, with a cyclopentenolone named pyrethrolone. Although the structures of the acid components of these esters as determined by them have been shown to be correct, several revisions have since been made in the pyrethrolone moiety in the past fourteen years, for the most part by LaForge and his associates (3). In the course of these investigations, two more insecticidal constituents, cinerins I and II were discovered.

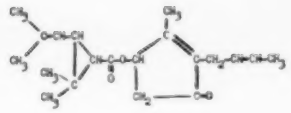
The revised structures of the four insecticidal constituents of pyrethrum flowers are as follows:



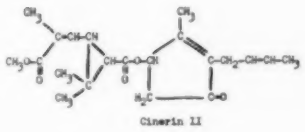
Pyrethrin I



Pyrethrin II

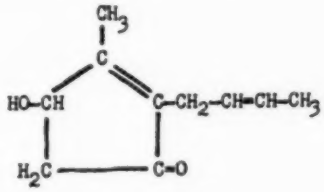


Cinerin I



Cinerin II

In January 1948 experiments were begun on the synthesis of cinerin I which was selected because of its simpler structure and greater stability. Workers in England had already devised an improved synthesis of chrysanthemum monocarboxylic acid (4). The problem therefore was reduced to the preparation of cinerolone, the alcoholic part of cinerin I.



Cinerolone

Several months ago a stereoisomer of cinerolone was finally synthesized as follows: Pyruvaldehyde and an alkali salt of 3-oxo-6-octenoic acid are allowed to react in aqueous solution at room temperature and a pH of about 8. The resulting hydroxydiketone, purified by extraction and distillation, is cyclized by treatment at room temperature with aqueous alkali to yield a stereoisomer of cinerolone. When it was esterified with chrysanthemum monocarboxylic acid, the product was found in laboratory tests to be as toxic as the natural ester to house flies.

Other substituted cyclopentenolones, homologs of cinerolone having different side chains in the

Turn to page 89

To meet the demand for dependable 2, 4-D products—

SELL KATHON M-7

another reliable product of Rohm & Haas Company

YOU can offer this dimethylamine salt of 2, 4-D and know you are selling a *dependable* formulation.

YOUR CUSTOMERS will like its convenience. That's because KATHON M-7 is standardized at 4 pounds of 2, 4-D acid equivalent per gallon—a condition that simplifies dosage calculations.

KATHON M-7 is stable, even at low temperatures. And it does not precipitate in hard water.

KATHON M-7 has other advantages. Complete details, prices and samples, if you wish, are yours for the asking.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Suppliers' Bulletins

Offers Portable Sprayer

Farnam Equipment Co., Omaha, Nebraska, has introduced "Port-A-Spray," a portable power sprayer which weighs only 75 pounds. The sprayer is powered

"Port-A-Spray" by Farnam

by a 1½ horse power gas engine and will shoot a driving stream up to 25 feet, or the output may be adjusted to a fine cloud of spray mist. It delivers a gallon per minute at pressures adjustable up to 150 pounds, the makers say. Literature on the "Port-A-Spray" is available from the company, 4603 Dodge St., Dept. 371, Omaha, Nebraska.

•

Livestock Parasite Control

Julius Hyman & Co., Denver, have recently issued a revised bulletin dealing with control of such livestock parasites as ticks, lice, mange mites, fleas and flies with chlordane. Copies of the bulletin, Technical Supplement No. 203C, are available.

•

Issues Toxaphene Bulletin

John Powell & Co., New York, have issued a recent technical bulletin on toxaphene. The bulletin covers results of field tests in a number of states where the material has shown effectiveness against army worm, boll weevil and grasshoppers. Potential use of toxaphene on potatoes, fruit, cereal and truck crops is also described. Chemical and physical data, description of analytical procedures, labeling information and other matters of interest to insecticide formulators are included. Copies of the bulletin are available from John Powell Technical Service Department, 1 Park Ave., New York 16, N. Y.

•

Miller Offers Catalog

Miller Chemical Co., Omaha, has recently published a complete catalog of its products, including a wholesale price list. Items include hand sprayers, rodenticides, insecticides, fungicides, seed treating chemicals, and fertilizers. Copies are available from the company, 15th and California Streets, Omaha, Nebraska.

•

Dow Herbicide Chart

Dow Chemical Co., Midland, Mich., has published a chart to be consulted as a guide in the use of the company's herbicidal products. The folder, which opens out to 22" × 26½", presents a list of crops in which weed control is desired, and after each crop gives the amount per acre for best results, when to use it, and special remarks giving additional information. One portion of the folder is devoted to information on how to choose the right weed killer, explaining the characteristics of 2,4-D, 2,4,5-T and the dinitros. The chart is available from the company.

•

Hough Co. Presents Folder

The Frank G. Hough Co., 743A Sunnyside Ave., Libertyville, Ill., has recently issued a folder on its new Model HM Payloader Tractor Shovel. The new piece of literature which opens up to 22" × 32", contains numerous action shots of the machine which features four-wheel drive. This feature enables it to work in sand, mud and rough terrain. Bucket capacity of the Payloader is one and one-half cu. yards, and its horsepower is rated at 76 hp. Copies of the literature are available from the company, address previously mentioned.

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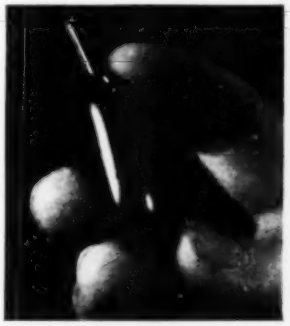
"Mixits" Placed on Market

Southern Entomological Co., West Palm Beach, Fla., has developed a new product, "Mixit," to



Size of "Mixit" Capsule

assure correct use of water soluble insecticides. The makers state that danger of improper use of concentrates is eliminated by sealing the exact quantity of concentrate in a gelatine capsule, to mix with a quart of water. The company indicates that the product will be marketed nationally in a short time.

•

Grasshopper Poster Out

Hercules Powder Company, Wilmington, Del., has prepared a grasshopper poster size 13" × 20", with space at the bottom for dealer's imprint to be added. The poster features an enlarged picture of a grasshopper, with the printed legend: "Kill grasshoppers . . . Toxaphene." It states that the material is recommended by the U. S. Department of Agriculture for use as dust, spray, or bait.

•

Velsicol Bulletins Published

Velsicol Corporation, Chicago, has published recent bulletins on its product, "Velsicol 1068" chlordane. The first presents a list of pests controlled by the product

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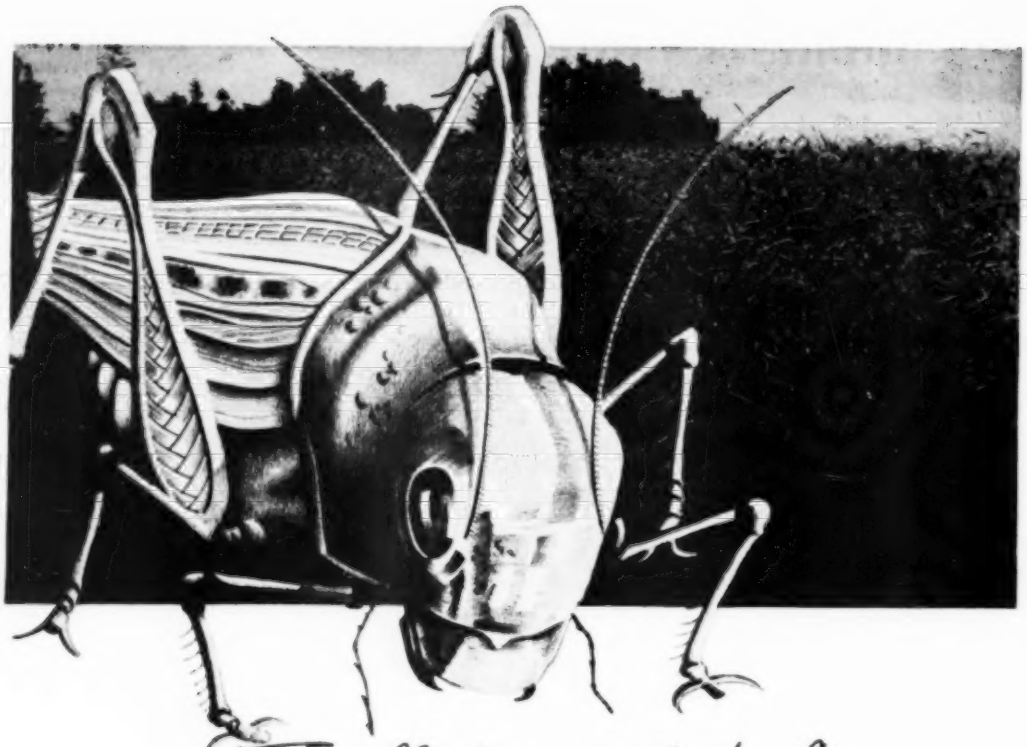

For effective control of

grasshoppers, boll weevil and certain other insects

Two Pittsburgh formulations of Toxaphene have proved to be chemicals of unsurpassed usefulness in controlling grasshopper plague, boll weevil attack, and the damage of many chewing and sucking insects. Both products have been exhaustively field tested under plague conditions, from Canada to South America. They are killers of extraordinary merit.

Pittsburgh Toxaphene—40

A 40% Toxaphene Concentrate impregnated upon a dust carrier designed for use by manufacturers, processors or compounders equipped to blend and dilute it to a finished dust. Especially effective as a cotton insect poison. Full technical information and insects controlled given in Bulletin 107.

Pittsburgh Chlorophene—60

A standardized liquid emulsifiable concentrate containing 60% by weight (6 lbs. per gallon) Toxaphene, specifically designed for use where a water spray application is adaptable and practical. *Pittsburgh* Chlorophene-60 spray concentrate possesses the advantages of marked residual action and is effective on a wide range of insects as described in Bulletin 107.

Write Today for Technical Bulletin No. 107 and Quotations on your Requirements.

PITTSBURGH AGRICULTURAL CHEMICAL CO.
6505-A Empire State Building · 350 Fifth Ave. · New York 1, N.Y.
An affiliate of
PITTSBURGH COKE & CHEMICAL COMPANY
Grant Building · Pittsburgh 19, Pa.

Reduced Packaging Costs...

...part of the 2¢ per pound you save by using CELITE* in your primary grinds

THE USE OF CELITE* 400 may save you up to 2¢ per pound on every pound of toxicant you grind. You'll find that Celite's high absorption properties permit grinding of higher concentrate poisons . . . and that the net result is lower costs all along the line.

Here are some of the ways in which Celite 400 can help you save:

Reduced grinding costs: Because of Celite's higher liquid absorption properties (more than twice its weight of water), you can grind up to 70% DDT mixtures. High concentrates of BHC and other low melting point poisons may also be ground with Celite.

Reduced packaging costs: The higher strength primary grinds made possible by the use of Celite 400 enables the packaging of more toxicant per unit package.

Reduced storage and shipping costs: These highly concentrated primary grinds produced by the use of Celite 400 ship and store more economically.

In addition to economy, Celite 400, used as the sole primary grinding aid, gives greater kill power to the toxicant. As the absorbing agent for liquid poisons, too, Celite 400 produces highly concentrated dry dusts at the lowest possible cost. For further information, write Johns-Manville, Box 290, New York 16, N. Y.

TYPICAL CELITE 400 PROPERTIES

Fineness: 8% maximum on 325 mesh
Density (Vibrated): 12.5 pounds per cubic foot
Bulk: Celite bulks much higher than most diluents
Absorption: 215% of its weight of water
400% of its weight of kerosene
pH Value: Below 7.0
Inertness: Compatible with insecticide and fungicide poisons
Suspension: Excellent in both air and water
Composition: Celite is amorphous diatomaceous silica (SiO_2)

*Reg. U. S. Pat. Off.

Johns-Manville CELITE 400

...for packaged commodities

Every month more shippers use SIGNODE® RETAINING STRIPS to protect their carloads of cartons, bags, boxes and packages against car doorway damage in transit because the sturdy kraft paper, steel strap reinforced strips are:

1. ***A LOW-COST***, effective way to keep containers safely out of the door recess.
2. ***QUICKLY APPLIED*** with hammer and nails.
3. ***ELIMINATE*** car door liners.
4. ***EASILY*** removed for unloading.
5. ***REDUCE*** dunnage weight.

Write for Complete Details on Both These New SIGNODE® Products.

...for bulk commodities

SIGNODE® ONE-PIECE RETAINING DOORS are today's answer to economical doorway protection for your bulk carload shipments. Over 300,000 strong steel strap reinforced SIGNODE RETAINING DOORS have proved these advantages:

1. ***LOW COST*** — savings in material.
2. ***EASILY APPLIED*** — with hammer and nails.
3. ***FAST UNLOADING*** — just cut and drape back.
4. ***SAVES STORAGE SPACE*** — requires fraction of storage space of alternate bracing material.

SIGNODE

SIGNODE STEEL STRAPPING CO.
Railroad Sales Division
2649 N. Western Avenue, Chicago 47, Illinois

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USE STEEL STRAPPING FOR CONTAINER AND CARLOAD PROTECTION

BAGS

Continued from page 29

sidewall layers increasing with the size and weight of the package. In light materials, sifting is a common fault, particularly through needle holes at the closure ends. Some manufacturers dip these packages in a wax or paraffin solution to seal up these tiny openings. One closing machine features the folding of a gummed paper seal over the stitched closure to prevent sifting through the needle holes.

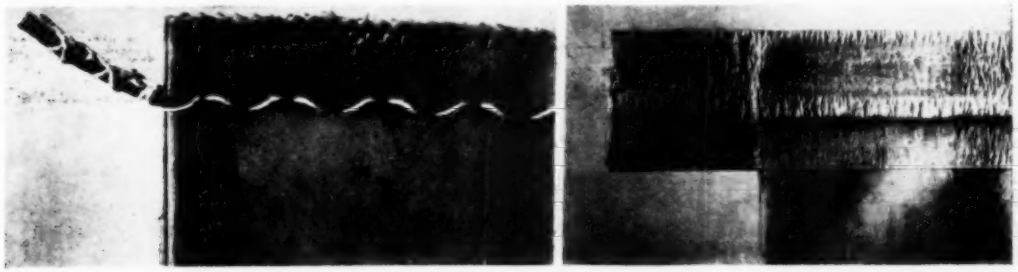
Another method frequently used to sift-proof a sewn seam is with filler cord, a soft cotton cord which is sewn tightly against the bag during the closing operation.

There is another classification of shipping sacks not mentioned previously. These are the waterproof laminated textile bags. They are constructed of cotton or burlap textiles laminated to one or more sheets of paper. These bags have the advantage of not only protecting against sifting, moisture loss or gain, and other contamination, but are exceptionally strong and suited for packaging extra heavy or highly valuable chemical materials. They can withstand the unusually rough handling of L.C.L. and export shipments. This type is available in acid, grease and other resistant qualities.

Filling and closing open-mouth multiwall paper bags. On this type the sewn closure is usually preferred. Photo courtesy Bemis Brothers Bag Co., St. Louis.

THAT the bag presents important economies to the manufacturer who uses this means to ship his products is widely recognized and accepted. But, those economies entail correct handling all the way from the filling operation until they are opened by the ultimate consumer of the packed product. When shipping containers as a whole are considered, abusive handling operates to the disadvantage of the paper sack. For years, the railroads and other carriers have refused to accept any other view of this problem based on records of experience. The bag was held to be not foolproof against bad handling. That education is the basic answer to this is evinced by campaigns conducted from time to time by individual bag manufacturers and by the Paper Shipping Sack Manufacturers Association.

Cooperation by large bag users



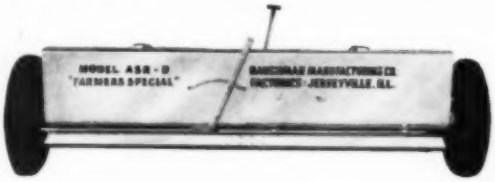
Close-up of the cushion closure stitch over which strip is attached to seal closure and prevent sifting in multiwall paper sacks. Photos courtesy Bagpak Div., International Paper Co., N. Y.

BAUGHMAN Designed for *Customized spreading

Money-Maker for Commercial Operators

Baughman Self-Unloading Body with attachments keeps busy doing all kinds of profitable jobs. Spreads lime, distributes phosphate, unloads or spreads road rock, delivers coal or grain, etc. etc. etc. Photo shows Phosphate Spreader Attachment which spreads 16½' widths . . . covers 2 acres per mile at speeds up to 15 mph. Easily attached or removed.

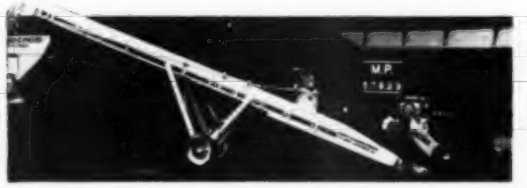
* CUSTOMIZED — designed for the job. These Baughman products are specially built for fertilizer handling.



"Farmers Special" Meets All Requirements

Two models—each specifically designed for perfect results. Style "A" whips and agitates with double agitator . . . spreads high analysis fertilizers evenly at all ground speeds—heavy or light, as required. Style "D" has shuttle wiping movement for fertilizers that should not be mixed or churned. Both spread from 100 to 8000 lbs. per acre. Tractor seat shut-off, convenient volume adjustment.

BAUGHMAN *Customized
CONVEYING EQUIPMENT



The wise commercial operator reduces his handling costs and increases his service and efficiency by using equipment designed for the job. The Baughman Belt & Bucket Elevator (right) stores in bulk and delivers in bulk—eliminates bagging. The Baughman Open Trough Belt Conveyor (above) loads and unloads up to 60 tons per hour. Portable and perfectly balanced.

We invite your inquiries also on our special built-to-order material handling equipment. WRITE FOR FULL DETAILS.

BAUGHMAN

BAUGHMAN MANUFACTURING CO., Inc.
961 Shipman Rd., Jerseyville, Ill.
"There is a Baughman Distributor Near You"

is likewise held to be in behalf of their own interests inasmuch as the package as it is shipped is their product and bears their name. Blame for a damaged package is usually charged to the name which it bears. Not too many years hence, paper sacks with the tensile strength of burlap and the durability of wood or fibre may be available, but until then, those who know and who have studied bag handling seem to agree that continuous education of the bag user and handler is the best solution.

With the advent of wider uses for paper sacks of all types, developments to meet new problems have been made. In turn, this also has brought application of these developments to older uses. Today, almost every type of paper sack where the tonnage warrants has been "tailored" to meet the requirements of the use to which it is to be put. Expanded demand for paper bags and the technical improvements of recent years have gone hand in hand. A better package at lower cost is still held to be the assurance of a continuation of this expanded use in the years ahead.

Bemis Appoints Williams

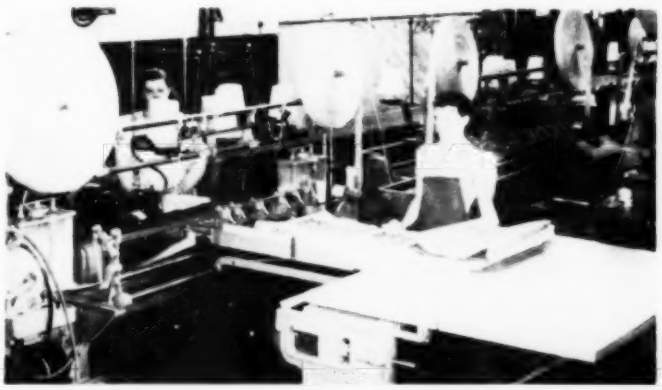
Alfred B. Williams has been appointed sales manager of the Vancouver, Washington plant of Bemis

ALFRED B. WILLIAMS

Paper Bag Company, subsidiary of Bemis Bro. Bag Co.

Mr. Williams started with Bemis in 1942 as a factory representative.

Filling and sealing at 14 to 16 bags per minute with Bagpacker equipment. Photo courtesy Bagpak Div., International Paper Co., New York. (Above).



Some of new equipment recently installed in plant of Kraft Bag Corp., Gillman, Vt. for sewing open mouth and valve type multiwall shipping sacks. (Below).

MATERIAL HANDLING

Over 45,000,000 tons of lime, fertilizer, insecticides, fungicides, weed killers, and other agricultural chemical products are processed and handled yearly in the U. S. Demand for fast and economical handling of this large tonnage has brought widespread mechanization in the industry. A photo-story on material handling in the agricultural chemical field will cover this important subject in the next issue of AGRICULTURAL CHEMICALS.—The Editors.

Synthesis of Nitro Alkane Derivatives Related to DDT Described in Paper

Results of the synthesis of fifty-two new nitro alkane derivatives related to DDT were reported by H. B. Hass, General Aniline & Film Corp., New York, in his presentation of the paper, "Nitro Alkane Derivatives Related to DDT" at the recent meeting of the American Chemical Society in San Francisco, Calif. Many of these compounds are more effective than DDT, and two of them, namely, 1,1-bis-p-chlorophenyl-2-nitropropane (BNP) and 1,1-bis-p-chlorophenyl-2-nitrobutane (BNB) are about five times as active as DDT.

Continued investigation of a number of compounds related to DDT led Paul Mueller, who discovered that DDT (1,1,1-trichloro-2,2-bis-p-chlorophenylethane) is an insecticide, to arrive at the conclusion that there is a definite relation between the insecticidal properties of a compound and the anesthetic potency of the derivative formed by supplying hydrogen to the No. 1 carbon atom in place of the diarylated methane radical.

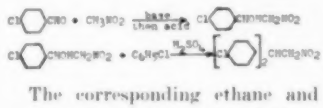
The synthesis of a number of nitroethane derivatives has shown these compounds to have a small amount of insecticidal activity, but no anestheteic properties. Further research along these lines has drawn Dr. Mueller even further away from his original hypothesis.

On the observation that 1,1-dichloronitroethane is an insecticide, while its parent compound, nitroethane, is not, a series of experiments was conducted by Dr. O'Kane, Durham, New Hampshire, investigating the effect of additional aliphatic chlorine atoms. Results of these tests indicated diminished insecticidal activity.

On the basis of these and other such studies, the theory has been devised that, at present, there is no way of predicting from the structure of a compound whether it will have insecticidal properties or not. Furthermore, the more compounds one investigates, the more likely one is to find a compound with insecticidal activity.

Tests conducted on the compounds synthesized are presented in tabular form as to analysis, boiling and melting point, and are classified into the following groups: Diaryl Nitro Alkanes; Chlorinated Diaryl Nitro Alkanes; Cyanoethylated Diaryl Nitro Alkanes; and Diarylalkylamines. The preparation and analysis of one compound from each group is included with the report.

The general procedure used in the synthesis of the nitroalkane derivatives is that used by Dr. Mueller in the preparation of the ethane derivatives:



The corresponding ethane and pentane derivatives of the 1,1-bis-p-chlorophenyl-2-nitropropane compounds are being investigated by Dr. O'Kane. Results of his studies to date have been quite outstanding and will be reported on completion of the trials.

The insecticidal properties of DDT have been attributed to the aliphatic chlorine. Experiments involving further modification of the aliphatic end of the molecule are now under way.

●

Cattle Fly Control Report

In 1948 tests, single applications of 1% methoxychlor emulsion to a milking barn 100 × 40 × 8, continued to kill flies from May 28 through October 11, when the first killing frost came. In another test, the barn and 75 dairy cows were sprayed thoroughly with 1.0% methoxychlor wettable powder on May 6, and all flies were controlled for 62 days. On July 16, when there were no horn flies, but some stable flies numbering about 25 per animal were present, the cattle were resprayed with 2.0% methoxychlor wettable powder and as a result, were kept free from all flies for the following 10 days. At no time until killing frost, were there more than five stable flies per animal, and no horn flies at all.

Despite the volume of recent conflicting statements regarding the use of DDT on livestock, there will be more DDT and other good chlorinated insecticides used in the Southwest on livestock this year than ever before. . . . Regarding the reaction of cattlemen and dairymen in the Southwest to the recent announcements on the restricted use of DDT, most beef cattle growers are continuing to use DDT for fly control this season. Some are adding BHC to get faster fly kill. We have had little or no trouble with DDT-resistant flies in this area. Whenever we have a tough fly problem, we mix BHC or gamma isomer BHC with DDT or methoxychlor. We have found no flies that can take this mixture. Some well-informed dairymen are switching to methoxychlor or pyrethrum-piperonyl butoxide. . . . Availability of material is a problem. DDT is for sale at every cross roads. Methoxychlor is harder to get. Of course, use of all insecticides depends on effectiveness, cost, and availability. The cattleman who has had success with one material will continue to use it until he finds something better.

—Excerpts from paper prepared by Ray L. Cuff for presentation before Convention of National Association of Insecticide and Disinfectant Manufacturers, Inc., Drake Hotel, Chicago, June 13 & 14, 1949.

●

Conn. Chinch Bug Circular

Connecticut Agricultural Experiment Station, New Haven, has issued circular 168, "Chinch Bug Control in Lawns". Written by J. C. Schread, the folder discusses control with DDT, DDT and Sabadilla, chlordane, and through biological means. It shows pictures of the chinch bug for easy identification, and describes in detail the proper procedure to follow in application.

SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

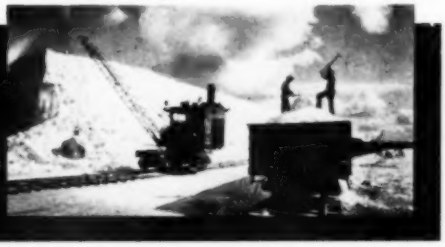
*LOADING

Sulphur intended for vessel shipment is brought to Galveston by rail from the mines at Newgulf. It is transferred directly from cars or from storage bins to the vessel.

The loading plant consists of two parallel storage bins spaced far enough apart to allow room for railroad tracks, tracks for the hoppers and cranes, and an endless conveyor belt. The belt along the center line between the bins is straddled by four cranes and their movable hoppers.

The cranes pick up the sulphur from the bins or cars and dischatge into the hoppers, which automatically feed the belt. It is weighed while on this moving belt. After weighing it is discharged onto a smaller belt which in turn discharges through a cylindrical telescopic spout directly into the vessel's hold.

Loading operations at one of the huge vats of Sulphur at our Newgulf, Texas mine. Such mountains of Sulphur are constantly being built at our mines, from which shipments are continually made.



TEXAS GULF SULPHUR CO. INC.

75 East 45th St. New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

INDUSTRY NEWS

Jensen to Am. Cyanamid Co.

Arthur O. Jensen has been named by American Cyanamid Co., New York, as agriculturist

for the midwestern states. Announcement of Mr. Jensen's appointment was made by F. S. Washburn, director of the company's agricultural chemicals division. Mr. Jensen is a graduate of the University of Wisconsin. He will maintain headquarters in Madison, Wisconsin.

•

Pacific Slope Meeting On

Scheduled to meet at Bright Angel Lodge, Grand Canyon, Arizona, the Pacific Slope Branch of the American Association of Economic Entomologists was preparing for the three day conference as we went to press. The meeting was to begin on June 16.

On the advance program were announcements of discussions on the mode of action of new insecticides; synergists for insecticides; insect resistance to DDT and other chlorinated insecticides; new equipment for insecticide application; biological control and insect pathology. The annual banquet was to be held on the evening of June 17.

A full report of the meeting will be presented in next month's issue by Dr. Alvin J. Cox, member of the *Agricultural Chemicals* editorial advisory board, who was to attend the gathering.

•

Production at New Plant

The first operating phase of Pennsylvania Salt Manufacturing Company's new fluorine chemical plant in Calvert City, Ky. was to begin in June, the company has announced. Under construction for approximately a year, the new plant will now produce sulfuric acid and hydrofluoric acid on a 24-hour-a-day basis, it is stated.

The new plant utilizes the latest safety and engineering developments and will employ approximately 50 people at first, with an expanded personnel as production increases. Cost of the unit was $2,000,000. James McWhirter, formerly superintendent of Pennsalt's Natrona, Pa., plant, is in charge of the Calvert City operation.

MEETINGS

North Central Division American Phytopathological Society University of Nebraska, Lincoln, June 27 & 28, 1949.

Field Meeting for Insecticide & Fertilizer Mfrs., Dealers and Salesmen. Edisto Experiment Station, Blacksville, S. C., July 28, 1949.

Centennial Symposia on Plant Nutrition. University of Wisconsin, Madison, September 1–7, 1949.

American Society of Agronomy, Milwaukee, Wisconsin, October 24–28, 1949.

California Fertilizer Association, 26th Annual Convention, Palace Hotel, San Francisco, Calif. November 7, 8, 9, 1949.

North Central Weed Control Conference, Sioux Falls, S. D., Dec. 6, 7, 8, 1949.

American Association of Economic Entomologists, 61st Annual Meeting, Tampa, Florida, December 13, 14, 15, 16, 1949.

No Chlorinated Hydrocarbons to be used on dairy cattle!

The Insecticide Division of the U. S. Department of Agriculture has sent letters to insecticide formulators advising that no chlorinated hydrocarbon insecticides may be used on dairy cattle, in dairy barns, or on cattle being finished for slaughter. The only exception is methoxychlor, which is still regarded as safe for such use.

The new ruling is an extension of the recent orders regarding DDT which were made public last month. Materials included in the new order are toxaphene, chlordane and technical BHC.

As in the case of DDT, labels on these products must be altered by the addition of a caution not to use these insecticides on dairy animals and in dairy barns.

•

A.S.A.E. Meets in Mich.

The annual meeting of the American Society of Agricultural Engineers was scheduled to be held June 19–23 on the campus of Michigan State College, East Lansing. The advance program called for discussions on power and machinery, rural electrification, problems with soil and water, as well as a number of sessions on education and a teacher-trainer program.

•

Brooks Joins N. S. Koos

Dr. James W. Brooks has joined the staff of N. S. Koos & Son Co., Kenosha, Wisconsin, to assume charge of development of their new department for insecticides, fungicides, and weed control chemicals. Koos & Son for many years have produced the well-known Badger Brand line of fertilizers. Dr. Brooks is an entomologist, a graduate of the University of Wisconsin, and was formerly associated with the Ralston-Purina Company.

House to Study Residues?

Representative Frank B. Keefe, Republican of Wisconsin, on May 9 introduced into the House of Representatives a resolution (H. Res. 207) which calls for a seven-member House committee to investigate and study the effects of use of certain chemicals and compounds in connection with their relationship to food.

The committee's study would follow three general lines: first, the nature, extent and effect of the use of chemicals, compounds and synthetic materials in the production, processing, preparation and packaging of food would be investigated to determine their effect on national health and upon the "stability and well-being of our agricultural economy."

Second, the committee would also study the use of pesticides and insecticides with respect to food and food products, particularly the effect of any toxic residues remaining after their use.

Third, the use of chemicals and synthetics in fertilizers would be studied in regard to effect on the soil itself, on vegetation raised on such soil, on animals fed on the products of such soil, on food products involved, and on the public health and welfare.

The committee would be empowered to subpoena witnesses, books, correspondence and documents, and to conduct hearings at any time, regardless of whether Congress is in session.

The resolution has been referred to the House Committee on Rules.

Mr. Keefe is also the author of H. R. 3045, a bill to regulate manufacture and registration of fertilizers shipped in interstate commerce.

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Oversight Noted

Through an error, reference to source was omitted from the article entitled "Controlling Flies With BHC" which appeared in our April issue. Credit should have been given to Bulletin #38, Citrus Experiment Station, Riverside, California. Authors of the original bulletin were Drs. R. B. March and R. L. Metcalf.

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Western Shade Tree Conference

The Western Shade Tree Conference was scheduled to hold its annual meeting at Sacramento, California on May 25-28. Because the event came so late in the month, it will be necessary to carry the account of the meeting in our next issue.

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A.A.E.E. To Florida in Dec.

The 61st annual meeting of the American Association of Economic Entomologists will be held December 13-16, inclusive, at Tampa, Florida. Program details have not yet been announced, nor has the hotel been named. However, such information will be published as it develops.

Calspray Opens New Plant

California Spray Chemical Corp., Richmond, Calif., has announced that its new insecticide processing plant and district office headquarters will soon open in Caldwell, Idaho. Tom Strand, district manager of the Rocky Mountain territory of Calspray, will make his headquarters at the new location.

According to Mr. Strand, the new plant will process a number of organic insecticides, including the company's "Persisto" (DDT), "Isotox" (pure gamma isomer of hexachlorocyclohexane), "Ortho-Klor" (Chlordane) and "Alltox" (Toxaphene). The plant is equipped with a dust mill capable of producing up to 6,000 pounds per hour.

The appointment of H. Rex Howard as office manager has also been announced, as have the appointments of John H. Gray as salesman for southern Idaho, and Robert V. Seaman as salesman in Colorado.

Dr. Crocker Retires

Dr. William Crocker, managing director of the Boyce Thompson Institute for Plant Research, Yonkers, N. Y., retired May 24 after a distinguished career. He had held his position at the Institute ever since 1921, when it was founded as a ten million dollar benevolence of the late Col. William Boyce Thompson.

Dr. Crocker announced that he would pursue his only hobby . . . gardening . . . upon retirement. He expected to go to work in earnest on his thirty-acre place located in the mountains of Pennsylvania, and there put to work some of his many ideas on how to make plants grow.

The Boyce Thompson Institute has announced that Dr. George F. McNew, head of the Botany Department of Iowa State College, Ames, will succeed Dr. Crocker as director, effective September 1. Dr. McNew has long been prominent in scientific circles, and has been at Iowa State for the past two years. Before his tenure there he was connected with the Naugatuck Division of U.S. Rubber Company and with the Rockefeller Institute of Plant Research at Princeton, New Jersey.

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Betts Joins Valley Chem.

Paul C. Betts, until recently southeastern representative for Pennsylvania Salt Manufacturing Company, Philadelphia, joined Valley Chemical Company, Greenville, Miss., as manager, June 1. He will be in charge of both sales and manufacturing operations.

PAUL C. BETTS

Mr. Betts attended the University of Delaware and the university of Maryland, graduating from the latter in 1943. He served three years in the U. S. Navy following graduation, then joined Pennsylvania Salt Manufacturing Company upon separation from the Navy.

Mr. Betts succeeds Albert B. Connelly as manager of Valley Chemical. Mr. Connelly has recently joined the sales staff of General Chemical Company, New York.

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Pennsalt Names Officers

George B. Beitzel was named president of Pennsylvania Salt Manufacturing Company, Philadelphia, at a recent meeting of the company's board of directors. He succeeds Leonard T. Beale, who will continue as chairman of the board. At the same meeting, William P. Drake was elected vice president in charge of sales, and William F. Mitchell as vice president in charge of manufacturing.

Subscribers Correct Editor

Following publication of our June issue, a number of letters came in pointing out mistaken implications contained in our editorial discussing the control of Klamath weed by biological means. Some of the points made by our subscribers are well worth repeating. One was that there is very little possibility of the Klamath beetle, the insect employed in the control program, getting out of hand and devouring valuable crops. This possibility was "very thoroughly explored before any release of the insect was made," the correspondent says.

Commenting on our speaking of chemical control as a "fool-proof remedy," another writer says he wishes that it were just that! Chemicals should be regarded as an adjunct to, rather than a substitute for good farm practices for weed control, he said, and continues: "Good farmers have always been able to keep the weeds under reasonable control, and did so long before chemicals were invented."

James K. Holloway, entomologist at the California Agricultural Experiment Station, Albany, Calif., points out that during the past 30 years, chemistry has been used in the fight against Klamath weed, but despite these efforts, the acreage has increased from 100,000 to 400,000. "This is not the fault of chemistry, but is a problem of economics and inaccessibility of the land to be treated. We believe, therefore, that biological control is one approach to the problem and is worthy of a fair trial. We in the west who are more closely associated with the problem, realize there is a place for all methods of control . . . and we encourage chemical control to clean up infestations on valuable accessible land and to clean up infestations encroaching into new areas."

Another subscriber reminded that in many cases the use of pesticidal chemicals, notably the arsenicals, has resulted in harming soil fertility for certain crops, and arsenites repeatedly used as weed-killers have in some cases been so effective in killing plant growth that plants have not been reestablished in the treated area. "Much has appeared in reference to these matters and one could easily say that there are too many unanswered questions about them even to suggest the use of many of the new pesticidal chemicals. Research that justifies many suggested uses of available chemicals is far less extensive than that which is available to support the soundness of the control program which prompted the editor's comments.

"The Klamath weed experiment was very carefully studied and appraised from all points of view before it was initiated," the subscriber states. Before it was decided to release the beetles into the U.S., they were tested here to assure they would not change their habits or attack plants of agricultural value.

CAL-NITRO

TRADE MARK REG. U.S.PAT. OFF.

Is the Perfect Topdresser

NITROGEN IN TWO FORMS

Cal-Nitro* has half of its nitrogen in the nitrate form, and the other half in the ammonia form. This assures fast action when needed and makes feeding last throughout the fruiting season.

NITROGEN AT LOW COST

Cal-Nitro is high in nitrogen—with a guaranteed nitrogen content of 20.5%. It provides nitrogen at *lower cost*.

NON-ACID SOIL REACTION

Cal-Nitro is exactly neutral—neither alkaline nor acid-forming.

ESSENTIAL PLANT FOODS

Cal-Nitro also contains Calcium and Magnesium—plant foods which are essential for vigorous growth and maximum production.

EASY APPLICATION

Cal-Nitro is in pellet form—free flowing and easy to apply by hand or machine.

The Ideal Nitrogen Material for Topdressing

COTTON
CORN
SMALL GRAINS
FRUITS
VEGETABLES

* The Synthetic Nitrogen Products Corporation owns the trademark "Cal-Nitro", which is used to designate a nitrogen fertilizer compound.

SYNTHETIC NITROGEN PRODUCTS CORP., 285 MADISON AVENUE, NEW YORK 17, N. Y.

Fertilizer News

Expands Phosphate Production

Newark, California has been selected as the site of the new Pacific Coast phosphate operations of the Food Machinery and Chemical Corporation, the company has announced. The plant will adjoin the magnesium oxide plant now operated at Newark by the Westvaco Chemical Division.

The new plant is part of the expansion of phosphorus and phosphate production which was announced earlier. The project involves the construction of a second electric furnace at Pocatello, Idaho, as well as an expansion of the Carteret, N. J. phosphate producing facilities. Construction schedules call for the new facilities to be in operation early in 1950.

•

Radioactive Research in Va.

Dr. S. S. Obenshain, agronomist at the Virginia Agricultural Experiment Station, has announced that the Station will use radioactive isotopes during 1949 to test the utilization of fertilizer materials by various plants. Particular attention will be paid to discovering the course of phosphorus in pasture crops, with an eye to determining new means of increasing the availability of the plant food to the crop. Research is expected to be conducted in greenhouses only during this year.

Swift Opens Florida Plant

The opening of its new phosphoric acid and triple superphosphate plant at Agricola, Florida, has been announced by Swift and Company. The firm, long a producer of phosphate rock and single strength superphosphate, is now furnishing triple superphosphate to its 23 mixing plants in the United States and Canada. The company expects to offer the extra tonnage for sale to fertilizer manufacturers.

A. H. Bowers, agronomist of the Swift Plant Food Division, states that the triple superphosphate will average about 45 percent available P_2O_5. The material finds its chief use in the manufacture of high analysis mixed goods, although some is used in direct application. It contains no gypsum, he says.

Mr. Bowers explains further that in the southern states, "regular superphosphate will probably continue to be the cheapest source of P_2O_5, but in the manufacture of non-acid forming higher analysis plant foods demanded in this area, use of triple superphosphate for part of the P_2O_5 in formulas overcomes the problem of providing room for the neutralizing dolomite.

"For example," continues Mr. Bowers, "a neutral 6–8–8 with nitrogen derived from ammonia sources might require 508 pounds of dolomite neutralizer per ton. This quantity of dolomite could not be included in the mix if regular 19 percent superphosphate were used, but with 80 pounds of

New triple superphosphate plant of Swift & Co., Agricola, Fla. At extreme left is contact type sulfuric acid plant. At center is structure housing production of phosphoric acid. At right is unit for production of superphosphate.

Scene at May 5th breakfast in Washington, D. C., when members of the American Agricultural Editors' Association were guests of National Fertilizer Association. At speakers' table left to right: C. L. Mast, *Agricultural Leaders' Digest*; Ray Yarnell, *Capper's Farmer*; Russell Coleman, NFA president; Berry Akers, *The Farmer*; and D. S. Murph, NFA secretary-treasurer.

45 percent triple were substituted for 186 pounds of the single strength material, there is room for it."

Freight economy in the middle west and northeast, in addition to increasing demand for "super" analyses, in those areas, will combine to create greater proportional increases in the use of triple superphosphate than in the south, it is pointed out.

During the war, Swift's plant food research laboratories in Hammond, Indiana, initiated a number of improvements in methods of manufacture, all of which have been incorporated into the new production unit at Agricola.

•

More Fertilizer for Japan

Suggestions for improvement of the fertilizer supply situation in Japan were included in the recent report submitted to General Douglas MacArthur by Frederick Pope, chief of the Department of the Army's chemical industry survey mission to Japan. In stating that "men and money could solve the raw material problem", Mr. Pope suggested that the sulphuric acid demand could be relieved if other substances were combined with ammonia in fertilizers, if use were made of sulfur dioxide in waste gases now being thrown away and if other nitrogen carriers were employed, as in the case of urea. The action of ammonium chloride and nitrochalk under Japanese conditions should be studied carefully, he advised.

Since the manufacture of urea and ammonium nitrate should be encouraged, the report recommended that fertilizer companies be authorized to produce nitric acid which had been banned in the past.

•

New England Soils Meeting

The annual New England Fertilizer Conference was held May 3 and 4 at Amherst, Mass., with approximately 100 agricultural workers and representatives of the fertilizer industry in attendance. Topics discussed included soil fertility, with particular reference to tobacco and to pasture and forage programs.

Dr. F. J. Sievers, director of the Massachusetts Agricultural Experiment Station presided at the meeting which was held in the Jones Library at Amherst. Ford S. Prince of the University of New Hampshire presented the outlook for the 1949 green pastures program; and Douglas B. Kitchel, St. Johnsbury, Vt., a winner in the 1948 All New England Green Pastures contest, explained the operation of his farm and spoke briefly on future pasture possibilities in his state.

The annual banquet, held on the evening of May 3, was presided over by E. S. Russell, who introduced guests and presented the speaker of the evening, Dr. Russell Coleman, president of the National Fertilizer Association. Dr. Coleman stressed the necessity of restoring or increasing the fertility level of agricultural soils

to keep pace with an increasing population and mounting needs for food, feed and fiber. He said that this can be done by employing superior agricultural practices, including adequate fertilization on arable land, even if some of the sub-marginal types of soil were removed from cultivation.

Speakers on the final day of the meeting included T. R. Swanback of the Tobacco and Vegetable Substation, Windsor, Conn.; Karol Kucinski, research professor of agronomy at the University of Massachusetts; and Dale Sieling, head of the department of agronomy, University of Massachusetts.

•

S. Carolina Field Meeting

An invitation has been extended to fertilizer and insecticide manufacturers, dealers and salesmen to attend a field meeting to be held on Thursday, July 28, at the Edisto Experiment Station, Blackville, South Carolina. Announcement of the meeting was made recently by Dr. B. D. Cloaninger, head of Clemson College Fertilizer Inspection and Analysis Department.

The program will include inspection of experiments being conducted at the station in the breeding of new varieties of sweet potatoes, mildew-resistant cantaloupes and investigations with insecticides, fertilizers and various crops.

Cooperating with Dr. Cloaninger in preparation for the meeting are Dr. H. P. Cooper, director of the South Carolina Experiment Station, and W. B. Rogers, superintendent of the Edisto Station.

•

Wisconsin Plans Symposia

Announcement of two University of Wisconsin symposia to be held from September 1 to 7, has been made recently. The first beginning Sept. 1 and continuing through the 3rd., will cover the mineral nutrition of plants; and the second phase beginning Sept. 5, will discuss plant growth substances.

•

700-Acre Farm Given to Va.

The presentation of a 700-acre experimental farm to the State of Virginia has been announced by John R. Hutcheson, Chancelor of Virginia Polytechnic Institute, Lexington. The farm was given by Paul Mellon, Upperville, Va., and is to be used primarily for pasture and livestock work. Experiments will be conducted in cooperation with projects at the Front Royal Experiment Station, and the farm will be operated as a unit of the Agricultural Experiment Station at Blacksburg.

Dr. H. N. Young, Director of the Blacksburg Station, has indicated that work at the station will include research in plant breeding, seed production, pasture management and techniques for evalu-

ation of pasture and forage crops in feed programs for different kinds of livestock.

•

Kyd Joins Texas Gulf

The Texas Gulf Sulphur Company has announced the appointment of Stirling Kyd to its Agricultural Department with headquarters in Houston, Texas. Mr. Kyd was formerly Associate Extension Entomologist of Oklahoma A. & M. College, and received his M.S. degree in Entomology from the University of Missouri in 1946. Previous to that time he had been Extension Entomologist of the University of Missouri.

—Photo Courtesy of American Plant Food Council

Nationally-known agricultural leaders were guests of the American Plant Food Council at a luncheon honoring members of the American Agricultural Editors' Association at the Carlton Hotel in Washington on May 5.

Shown above, left to right, are: Under Secretary of Agriculture, Albert J. Loveland; Clifton A. Woodrum, President of the American Plant Food Council; Rep. Harold D. Cooley (D-N. C.), Chairman of the House Agriculture Committee, Senator George D. Aiken of Vermont, ranking minority member of the Senate Agriculture Committee; W. T. Wright, Vice President, F. S. Royster Guano Co., Norfolk, Va., representing the Council's Executive Committee; and Keith Himebaugh, Chief, Office of Information, USDA.

Mr. Woodrum told the Association that the fertilizer industry is doing everything possible to supply the farmer, not only with as much plant food as is needed, but with the correct kinds. Manufacturers were compared to druggists who fill "prescriptions" of the Experiment Stations to meet the individual needs of various soils and crops.

Dr. Meyer Joins Federal Chem.

Federal Chemical Co., fertilizer manufacturer of Louisville, Ky., has announced the appointment of Dr. Theodore A. Meyer as head of its agronomy department. He will work closely with the sales department, keeping it informed of agronomic developments at the experiment stations, located in the states served by the firm. Dr. Meyer is a native of Alabama, a graduate of Alabama University, Alabama Polytechnic Institute, and Ohio State University. He served in the U. S. Navy during the late war.

Federal operates fertilizer plants in Columbus, Ohio; Nashville and Humboldt, Tennessee and Meridian, Mississippi in addition to its Louisville plant.

Roberts Retires from Bemis

Bemis Bro. Bag Co., St. Louis, has announced that Ernest B. Roberts will retire on July 1. Mr. Roberts is manager of the Bemis paper mill and multiwall bag factory at Peoria, Ill. He has been with the company since 1911, and has been mill manager since 1913.

He will be succeeded by L. J. Finn, now assistant manager of the Peoria plant. Mr. Finn has been with the company since 1914, and has been associated with the Peoria plant since 1925.

•

Signode Elects Leslie

John H. Leslie, formerly vice-president in charge of research and engineering, Signode Steel Strapping Co., Chicago, has been elected president of the company to succeed his father, John W. Leslie, who now becomes chairman of the board.

Other changes in the company's personnel involve John S. Gorman, formerly vice-president and director of sales, who has been named vice-chairman of the board; and J. M. Moon, who was advanced from sales manager to director of sales.

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Suppliers' Bulletins

Continued from page 59

and recommended concentrations. The second, technical bulletin No. 215, discusses carriers and diluents for chlordane dust formulations, and the third, technical bulletin No. 216, gives the chemical analysis of technical chlordane and chlordane formulations.

All are available from the Velsicol Corporation, 330 E. Grant Ave., Chicago, Ill.

•

New Borax Co. Products

Pacific Coast Borax Co., 510 West 6th St., Los Angeles, has issued folders describing two new products of the company "Polybor" and "Polybor-Chlorate" for weed control. "Polybor" is a general-purpose herbicide intended for use as a spray. It is non-selective in action. "Polybor-Chlorate" is said to be specially formulated to eliminate the fire hazard normally associated with sodium chlorate. Leaflets are also available on "Anhydrous Rasorite" and on "Borascu," a concentrated borate which is recommended as a non-corrosive, non-inflammable soil sterilant.

The company operates plants in Wellsburg, W. Va. and Mobile, Alabama in addition to the one at Canajoharie, N. Y.

•

Sample Pulverizer Offered

Precision Scientific Co., Chicago, has developed a pulverizer for grinding small samples from 3 to 20 grams. It will reduce 4 to 8 mesh material to 50-mesh screen, or finer, the manufacturer states.

The machine is essentially a small high-speed hammer mill with fixed (non-pivoting) hammers, the company points out. Further information may be had from the company, 3737 W. Cortland St., Chicago 47, Ill.

•

Vanderbilt Booklet

R. T. Vanderbilt Co., New York, has prepared a 42 page booklet describing its product "Veegum," an emulsifier, thickener and suspending agent. The product is described as having film-forming and unusual viscosity characteristics; is inorganic, odorless, tasteless and non-toxic. Copies may be obtained by addressing R. T. Vanderbilt Co., Specialities Department, 230 Park Ave., New York 17.

•

Weed Killer Booklet Offered

Autolene Lubricants Co., Denver 9, Colo., has issued a booklet entitled "Modern Methods of Eradicating Water Weeds from Canals," describing the action of the firm's product, "Dead-X" weed killer. It presents the answers to many of the problems which arise in the course of killing aquatic weeds, and shows illustrations of actual use of the material.

•

Folder on CPR Dust Base

U. S. Industrial Chemicals, Inc., New York, has just issued a four-page announcement featuring CPR Dust Base for use in truck farm insect control. This combination base, formulated for control of a wide range of insects attacking crops and vegetable and flower gardens, combines the three insecticides, cyclonene, pyrethrins and rotenone. They emphasize that there is no toxic residue problem in connection with "CPR Dust Base."

FERTILIZER REPORT

Continued from page 39

dropped to third in sales volume. Although the 4-10-6 grade led in sales volume for the region, it was the principal grade only in North and South Carolina. Grade 3-12-6 led in Virginia, 4-8-6 in Georgia and 4-7-5 in Florida. The 10 principal grades represented 77 percent of the total sales volume. Throughout this region 478 specified grades are sold. Sales volume was 4.2 percent less than in 1946–47.

Although the 2-12-6 grade leads in sales in the East and West North Central Regions, it no longer remains the leading grade in each of the states of these regions as in 1946–47. The 3-12-12 grade leads in Illinois, Wisconsin and Missouri and the 4-16-0 grade in South Dakota, Nebraska and Kansas. Thirty-five more grades, new to the regions, were introduced in 1947–48 making a total of 163 compared with 128 in 1946–47. The 10 principal grades

represented 91 per cent of the total sales volume. Sales volume was 19.7 percent more than in 1946–47.

Grade 6-8-4 leads in the East South Central Region due to the comparatively large sales volume in Alabama. Grade 2-12-6 was the largest seller in Kentucky, 3-9-6 led in Tennessee and 5-10-5 in Mississippi. In Kentucky the number of grades sold increased from 21, the number sold in 1946–47, to 32 in 1947–48 and in Alabama from 19 to 31. The 10 principal grades, however, represented 93 percent of the total sales volume. Sales were 21.8 percent higher than in 1946–47.

In all states of the West South Central Region, either the 4-12-4 or the 5-10-5 grade leads all other grades in sale volume by 56 to 92 percent of the total. Forty-two specified grades were sold, the leading 10 representing 96 percent of the total sales. Sales advanced 3.7 percent in 1947–48.

The aggregate sales of mixed fertilizer in the Mountain Region is the smallest of any region and totaled only 43,419 tons. The 10-20-0 grade leads in sales volume in this region and in three states, Montana, Idaho and Arizona. Each of the remaining states has a different leading grade: Wyoming, 10-18-5; Colorado, 10-16-8; New Mexico, 4-12-4; and Nevada, 10-10-5. In proportion to the total volume of sales, the largest number of different grades is sold in the region, totaling 86. The 10 leading grades represent 81 percent of sales volume. Sales advanced 26.4 percent compared with 1946–47.

The 10-10-5 grade leads in sales volume in the Pacific Coast States due to the large sales in California. The leading grade in Washington is the 5-10-10 and in Oregon the 10-16-8. Sales, in all states, are less than in 1946–47 and for the region decreased 18 percent. A greater number of grades were reported, approximately 61 more, making a total of 244 specified grades sold in this region. In addition, there are an undetermined number of specialty grades in both liquid and solid forms sold. The 10 leading grades represented only 70 percent of the total sales volume.

Materials

Shipments of the principal fertilizer materials for direct application as such and for home mixing are presented in Table 4. Total sales amounted to 5.6 million compared with 5.1 million tons in 1946–47. The aggregate sales increased 10.8 percent. Larger sales were made in all regions excepting the Middle Atlantic and East North Central where sales are below the previous year by 5 percent.

Total sales of chemical nitrogen materials are 5 percent greater than in 1946–47. Sales of ammonium nitrate are larger in all regions excepting the East and West South Central and Pacific Regions. Total consumption of ammonium nitrate was less, due to the drop in sales in the larger consuming states, Mississippi, Texas and California. Total sales of calcium cyanamide were less, due to lower consumption in the larger consuming states, North Carolina, Mississippi, Arkansas and Louisiana. Although practically all regions show an increase in sales of ammonium sulfate, the 40 thousand tons additional sales in 1947–48 are due largely to such increased sales in California. In states of the South Atlantic and East South Central Regions, increased sales of sodium nitrate averaged 57 percent. Smaller increases occurred in practically all the other regions. A marked increased tonnage of anhydrous ammonia was sold in Mississippi, California and several other states for direct application to the land during 1947–48.

The use of dried manures was about 10 percent higher in most regions. This report indicates a drop of about 20 thousand tons in use of other organics. The tonnage of cottonseed meal returned to farms by oil mills was not available for this report. Last year approximately 20 thousand tons was returned to farms by oil mills and may account for this difference.

The consumption of all phosphate materials increased about 10 percent. The total consumption of phosphate rock was about the same as last year. Usage of phosphate rock in the largest consuming state, Illinois, dropped 48 thousand tons but sales in a number of smaller consuming states more than doubled. Sales of normal superphosphate rose to 1.8 million tons compared with 1.6 million tons in 1946–47, whereas concentrated superphosphates remained about the same. Increased sales of ammonium phosphate (16–20) and basic slag accounted for a large part of the increase in other phosphates.

Consumption of potash materials increased from 90 to 103 thousand tons or about 14 percent. Most of the increase appears in the states of the South Atlantic, East South Central and Pacific Regions. Sales in a number of states were below the 1946–47 level.

The usage of minor and secondary element materials increased about 10 thousand tons in 1947–48. The increase was general among many of the states.

Plant Food

The content of nitrogen available and total phosphoric oxide (P_2O_5) and potash (K_2O) in fertilizers sold during 1947–48 is presented in Table 5, by states and regions. The total plant food supplied amounted to 3.6 million tons compared with 3.4 million tons in 1946–47. In addition 336 thousand tons of "insoluble" phosphoric oxide was supplied by phosphate materials. Approximately 73 percent of the total plant food was supplied by mixtures. The plant food content of mixed fertilizer averaged 21.90 percent in 1947–48 as compared with 21.44 percent for 1946–47 and 21.65 percent for 1945–46.

The average percentage of plant food content of all fertilizers based on the available nitrogen, phosphoric oxide and potash is presented in Table 5, by States and Regions. The average of all fertilizers is 20.4 percent. In all but eleven states the average exceeded 20.4 percent. The lowest is in Illi-

nois due to the large tonnage of phosphate rock in proportion to other fertilizers. The highest is in Montana as most fertilizer usage in the state consists of high analysis mixtures and concentrated superphosphates.

The nitrogen supplied by all fertilizers increased from 784 thousand tons in 1946–47 to 864 thousand tons in 1947–48, an increase of 10 percent. The available phosphoric oxide increased from 1.74 million tons to 1.85 million tons and potash from 858 thousand tons to 921 thousand tons or 6 percent and 7 percent, respectively. In all regions the consumption of plant food was larger than in 1946–47 except in the South Atlantic and Pacific Regions. Less phosphoric oxide was used in the South Atlantic Region and a smaller tonnage of both nitrogen and phosphoric oxide was used in the Pacific Region. In both the South Atlantic and Pacific Regions, the tonnage of fertilizers sold was less than in 1946–47.

The tonnage of plant food (nitrogen, phosphoric oxide, potash) supplied by all fertilizers for the years 1944–45 to 1947–48 is represented in Figure 2. The total sales volume of all fertilizers is represented by the broken curve and shows sales have increased progressively from 1944–45 to 1946–47 at practically a constant rate. The rate of increase each year over this period has averaged 10.9 percent. Sales volume in 1947–48 was only 6.0 percent more than in 1946–47. The rate of increase of fertilizer sales has therefore decreased 4.9 percent in the past year.

The content of plant food per ton of fertilizer increased from the average of 20.19 percent for the years 1944–45 to 1946–47 to 20.38 percent in 1947–48. Fertilizers contained on the average a higher content of nitrogen and phosphoric oxide and a lower content of potash in 1947–48 as compared with the average for the 1944–45 to 1946–47 period. The average percentage content of nitrogen, available phosphoric oxide and potash in 1947–48 is 4.84, 10.38 and 5.16 compared with the average of 4.67, 10.23 and 5.29 for the years 1944–45 to 1946–47, respectively.

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Myers Markets New Spray Head

F. E. Myers & Bro. Co., Ashland, Ohio, has placed on the market a new product, "Myers Silver Cloud Spray Head," adaptable to all conditions of spraying. The makers state that the oscillating movement of the Spray Head can be changed to give the necessary amount of sweep required to cover trees of different sizes. The guns are adjustable for spray discharge as well as being adjustable for either vertical or horizontal positions. The device features ball and oilrite bronze bearings, and is designed for use with any make of

sprayer having the pump capacity to assure proper coverage. Two models are available to fit the needs of either orchard or grove owners. Literature is available from the company.

NACA MEETING

Continued from page 32

research activities of the state and Federal Governments; need for more information on residue breakdown and residue in foods; need for more complete data on the effect of newer insecticides on insect ecology . . . how they affect natural predators and beneficial insects; and, of course, more information on the effect of commonly-used toxicants on operators and users of them.

Dr. Guterman suggested that the Association keep an up-to-date file of false rumors and press releases in order to present rebuttals and to recommend improved means of use. He said that a file should also be kept of accidents in order to indicate where dangers are in the use of pesticides.

The "scare press" was cited by Dr. Guterman as one of the worst dangers to proper public relations for the industry. He termed such articles as the recent series on DDT, appearing in a number of daily papers, as a "gross misinterpretation of data." He stated that the industry needs accurate data on acute toxicity and on the level of chronic toxicity, and continued by saying that information on tolerances should be available so that "we can know where we are going."

"Keep Eye on the Ball"

EVERYONE in the industry is partly responsible for the current condition in the field. Many of the newer insecticides came on the market before all the answers were known. Farmers, too, are frequently guilty of misuse of the newer pesticides with whose action they are not acquainted. "We must all keep our eye on the ball," he said, "for we all have a stake in the industry." Restrictive legislation, which is not wanted by the farmer, the industry, nor by many others, will certainly be put in effect if the matter is allowed to get out of hand, he warned.

"We must all get behind the educational program to promote the best interests of all, including the public," he said. The speaker stated that all the cards should be laid on the table, and that the public be informed of what is being done for its protection. "If this is done, we can lick this residue problem to the satisfaction of everyone," he concluded.

Trigg Says "Advertise"

MR. TRIGG called attention to the fact that farmers are the actual customers of the agricultural chemical trade, and that their position in the national economy is one of basic importance. He emphasized that the farmer is an in-

dividualist, that he dislikes interference from Government, and "bureaucratic meddling." But while he dislikes such "meddling" on one hand, on the other, he fears hard times even more. Thus, "when he is threatened by big surpluses, glutted markets and tumbling prices, he seems as willing as any of us would be . . . to accept the controls set by Government in return for a guaranteed income."

Mr. Trigg went on to say for this reason, it is "just plain good sense" to help the farmer, industry's best customer, to make more money without sacrificing his individual initiative.

As a matter of suggestion, he called attention to state-wide cattle fly control programs which put hundreds of extra dollars in the pockets of small farmers through added production of milk and meat from unmolested animals. "Illinois farmers pocketed a total of four and a half million dollars in extra income last summer with this state-wide (fly) campaign," he declared.

"The new uses of insecticides and fungicides are of such vital interest to farmers, that the problem now appears to be one of supplying up-to-date information," Mr. Trigg continued. He pointed out helpful publicity which has appeared in various farm publications instructing farmers on the use of various insecticides to control cattle grubs. Complete control of these pests would bring to farmers an extra $100,000,000 annually, he declared.

The speaker quoted Dr. R. J. Haskell, U.S.D.A., in estimating the annual loss from plant diseases in the United States as being from 1½ to two billion dollars. Seed treatment, use of fungicides, and proper use of insecticides can work together to reduce these losses greatly, Mr. Trigg said.

He urged the industry to undertake a constant flow of information and tell the farmers over and over again what there is available, and point out to them its great economic value from their standpoint. Such an educational campaign—should be carefully thought out and continued long enough "to get under the skin of the farmers and produce results for them and at the same time for yourselves," Mr. Trigg concluded.

Forum Discusses Crisis

AN INDUSTRY forum, under the chairmanship of Wallace Moreland, assistant to the president of Rutgers University, New Brunswick, N. J. discussed the theme, "Industry faces a crisis." Comprising the panel, in addition to Mr. Moreland, were Ernest Hart, president, Niagara Chemical Division, Food Machinery and Chemical Corp., Middleport, N. Y.; Dr. L. Gordon Utter, Phelps Dodge Refining Corp., New York; Paul Mayfield, Hercules Powder Co., Wilmington, Del.; and Joseph Noone, technical advisor, National

Agricultural Chemicals Association, Washington, D. C.

The first speaker, Mr. Hart, stated that the purpose of the forum was to provoke thought, and to point out some of the problems of pest control from the standpoint of the customer. This group is simply trying to make a living, he reminded, and it faces a tremendous problem in knowing how to handle poisonous materials properly.

Confusion stems from numerous sources, Mr. Hart pointed out, but it is not difficult to imagine the state of mind of a grower who is advised on insecticides by the manufacturer; by the local mixer; by the salesmen of jobbers and dealers; by the press . . . often in conflicting slants from the technical and popular papers, by the U. S. Department of Agriculture; the Public Health Service; the State Experiment Station; the county agent; and then when he contracts with canners, he receives further instructions on how to use and apply various chemical compounds.

To correct the situation, Mr. Hart suggested that all of these advisors be kept up to date on developments, and that the industry participate in an educational program for this purpose. Manufacturers, he said, should enforce strict quality control of all their products, and keep the public informed of studies on residues, toxicity and other pertinent activities, and this information should have widespread distribution.

Marketing of new materials should be delayed until all possible is known about their properties, chronic and acute toxicities, and their effect on users and handlers, then the product should not be over-produced on the basis of unwarranted enthusiasm. Fieldmen, or salesmen, should be trained properly so that they are aware of the liabilities involved, as well as the mere technical aspects of the material they sell, Mr. Hart declared. He urged the manufacturers of basic chemicals to sell only qualified processors who are thoroughly familiar with correct handling procedures.

Dr. L. Gordon Utter reviewed the questions asked of the Technical Committee regarding the recent wave of unfavorable publicity. In analyzing it all, he said, it is evident that the industry is not to blame for the situation, because the materials in question were marketed in good faith, and other factors entered into the picture to change its complexion. The need for an industry-wide public relations program was voiced by Dr. Utter who proposed an immediate program to get the whole story before the public, and to continue to release authentic articles on how to apply pesticides, and other pertinent data. He proposed the es-

tablishment of a speakers' bureau, so that requests for persons to present the matter may be filled. He also stated that the industry may consider the production of a sound and color film to convey the industry's message.

Joseph Noone spoke briefly on the liability assumed by the manufacturer in putting various pesticides on the market. He said that court cases over damages to livestock or crops are frequently decided against the manufacturer, since the juries in such localities are usually made up of farm people. "Farm juries will see that the farmer is reimbursed," Mr. Noone stated.

He pointed out that protection of the public from toxic residues is one of the objectives of industry, and that the establishment of tolerances will offer the greatest amount of protection to the industry in the way of providing a legal basis for defense in the case of suit.

Final speaker on the panel was Paul Mayfield. He summarized the problems of the basic producer as being two-fold—first the technical responsibility to produce materials of good quality, and second, the moral responsibility to gather data and information about these products and pass this data on to the public.

He cited a number of examples where basic producers were mistaken in their early appraisals of chemical compounds placed on the market, and suffered financial losses from the resultant backfire. One case in particular was mentioned, where careful tests had been made before marketing a product, but yet the material reportedly caused injury to persons, and the maker was in trouble. The company thought it had given the preparation as thorough a testing as possible, yet, when in the hands of consumers, it developed toxic symptoms unlike anything noted in preliminary tests. The basic producer has obligations far beyond those conceived a few years ago, Mr. Mayfield said.

PYRETHRIN SYNTHESIS

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molecule also have been prepared by this method and esterified with synthetic chrysanthemum monocarboxylic acid. Some of these synthetic esters have proved to be even more toxic to house flies than the pyrethrum standard. For example, the compound having an allyl side chain, $CH_2 = CHCH_2$ —, in place of the 2-butenyl group, $CH_3CH = CHCH_2$ —, of cinerin I has proved to be more toxic than the combined active principles of pyrethrum flowers (5).

It is believed that these synthetic esters will be more stable and long-lasting in effectiveness than the natural pyrethrins. A number of industrial companies are investigating the commercial possibilities of this synthesis.

References

(1) Schechter, Green and LaForge, J. Am. Chem. Soc., *71*, 1517 (1949).
(2) Staudinger and Ruzicka, Helv. Chim. Acta., *7*, 177–259, 377–458 (1924).
(3) LaForge and Haller, J. Am. Chem. Soc., *58*, 1777 (1936); LaForge and Barthel, J. Org. Chem., *10*, 114 (1945); LaForge and Soloway, J. Am. Chem. Soc., *69*, 2932 (1947).
(4) Campbell and Harper, J. Chem. Soc., 283 (1945).
(5) Gersdorff, W. A., J. Econ. Ent. (In press).

SPRAY-DIP

Continued from page 33

volume of 135 gallons per minute. Run-off solution is recovered through a drain pan in the bottom of the machine, and may be reused after being forced through a filter which strains out hair, straw and other foreign matter.

The makers state that the machine saturates every square inch of an animal's head and body in from 5 to 8 seconds. The nozzles are set against the grain of the hair, which permits immediate penetration to the hide, and, it is claimed, crystals of the toxicant lodge near the roots of the hair where they remain protected from sunlight and keep effective for a number of weeks.

Blaw-Knox Elects Two

Chemical Plants Division of Blaw-Knox Company, Pittsburgh, Pa., has announced the appointments of Arne Olson as chief process engineer, and R. H. Hazlett as manager of the oil and gas department.

Mr. Olson was formerly chief engineer of process equipment. He has been with Blaw-Knox since his graduation in chemical engineering from Carnegie Institute of Technology in 1930.

Mr. Hazlett will continue to serve as manager of gas equipment at one of the company's manufacturing plants, in addition to his new duties. He is a graduate of the University of Pittsburgh and joined the Blaw-Knox engineering staff in 1933.

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Snell Elects Officers

Foster D. Snell, Inc., New York, has announced the election of L. C. Cartwright, secretary; Albert F. Guiteras, treasurer, and Louis J. Bowlby, Jr., assistant treasurer, of the firm.

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GUEST EDITORIAL

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In 1940, the National Resources Planning Board found that 180 manufacturing industries were investing two percent of the gross value of their products in research. On this basis, the fertilizer industry would spend directly for research, approximately 16 million dollars. It may be admitted that two percent is high for an industry that operates on such a narrow margin as the fertilizer industry, but surely one-half or possibly one percent, could be spent to advantage. It is difficult to estimate the amount actually spent, but it is safe to say that the fertilizer industry's direct contribution to research falls short of totaling even one-half of one percent of its gross sales.

In California, the 1948 value of fertilizers and agricultural minerals is estimated at about 40 million dollars. One-half of one per cent of this figure would mean $200,000 for industry-sponsored research. There is some work being done by scattered organizations, but this effort represents only a small part of what should be accomplished.

For the past three years, members of the California Fertilizer Association have voluntarily contributed to the support of Association activities, including a $9,000 research grant to the University of California. The industry is aware that extensive work is necessary to increase our knowledge in the most effective use of fertilizer. The dissemination of such information to the farmer and grower is of great importance also. Federal and State taxes are used to support the University research and extension program, and a good job is being done with the limited funds available. The fertilizer industry in California is willing to pay into a Plant Food Investigation Fund, certain tonnage tax to be collected and spent under State supervision. This sum would be earmarked to tackle certain problems facing the farmers and growers as well as the industry. These problems, for example, concern mechanical condition of fertilizers, field placement, new fertilizer materials, etc., and are in no way intended to be a duplication of work now being done by Federal or State Agencies. Wherever such problems exist and can be studied more advantageously by Federal or State Agencies, the proposed legislation provides that funds may then be placed with such agencies. The Board to direct the work would consist of nine members appointed by the Governor, three of whom would represent the fertilizer industry, three of whom would be engaged in agriculture as a livelihood, and three of whom would be persons who are or have been engaged in agricultural research.

The problems of immediate concern to the industry are not in the pure research and highly technical aspects of fertilizer tests. The Agricultural Division of the University of California is adequately equipped to handle laboratory and greenhouse work, so this phase of investigation is not contemplated by industry. Rather they contemplate practical problems of fertilizer conditioning and compounding as they affect uniform application in the field and certain technological work to evaluate the many new fertilizer materials and agricultural minerals and combinations thereof.

The California Fertilizer Association is interested in attacking industry problems on an industry-wide basis, sponsored and supported by the industry in this way. The industry will gain satisfaction and pride in pointing to accomplishments from its efforts and support, which will in the end improve greatly the fertilizer situation in California for the farmer and grower. The University is engaged in fertilizer research studies and the State Department of Agriculture is concerned solely with regulatory work. Between these two activities is a vast field not receiving any attention at the present time. There are about seventy prime fertilizer manufacturers and mixers in California, but no single company is of sufficient size to conduct extensive investigational work by itself. Any important work that is to be done must of necessity represent a combined effort of all the small to medium-sized operators.

Our industry has only one customer, the farmer and grower who must obtain satisfactory results if he is to continue using fertilizers. In the event his crop is not up to expectations, the fertilizer user is faced with conflicting statements why, and he is barraged with all kinds of suggestions and recommendations of what plant foods to use for bumper crops. He is frequently confused and finally trusts no one to make recommendations. He thus attempts to experiment

some on his own. After discovering what he thinks is the correct fertilizer for his crop and soil, he is somewhat reluctant to advise others, because he is in competition with them in food production and desires to "cash in" on his "secret." Furthermore, his neighbors operate differently on different soils, and do not have the same crop history. Thus, they may not necessarily obtain the same satisfactory results.

There are numerous fertilizer tests conducted here and there on practically every crop grown in California. A worthwhile job which is not being done at the present time, would be to consolidate and coordinate the results from current fertilizer tests. This is another example of work that could be carried out by the proposed Plant Food Investigation Board.

The various beet sugar companies have agronomists conducting fertilizer tests and a consolidation of their valuable data would aid materially in determining the best plant food combinations for growth and sugar content. The large cotton oil producers are interested in cotton fertilization for increased yields. The Board could perform a valuable service by bringing together the various organizations concerned, and in this way institute needed investigation work.

The California State Legislature may not be sympathetic to industry's needs and requests as set up in pending legislation, but nevertheless, the problem exists and industry will continue its campaign for more research and investigational work for the mutual value of the user and industry. There are over 2,200 fertilizer salesmen registered and operating in the state of California. This is an important group in the agricultural field and every effort should be made to improve their value to the farmer and grower when recommending and selling plant foods and agricultural minerals.

DISEASE CONTROL

Continued from page 51

plant bed on April 13 revealed the presence of disease on pepper, as well as on eggplant and tomato. Sporulation was light to moderate on eggplant and very light on pepper and tomato. While the disease had caused moderate damage to eggplant and pepper, injury was negligible on tomatoes.

Late Blight

APPEARANCE and distribution of late blight on potato and tomato are shown on the map (Figure 2). Available reports so far do not indicate serious damage.

In Florida, decreased prevalence, as compared with the last few years, was manifested by easier control and moderate to slight loss. An outbreak of blight on the fall potato crop in the Belle Glade area spread rapidly in inadequately treated fields and caused heavy losses in some, but proper use of either "Parzate Liquid" or "Dithane D-14" gave excellent control. The uniformity of blight appearance in this region suggested spore showers from outside sources as the origin of infection. In the Homestead area, the slight loss to both potato and tomato crops was attributed to three factors: first, and most important, was the warmer drier weather that prevailed this season; second was the proper, frequent, and general use of fungicides; and third was the destruction of tomato seedbeds when no longer in use, thus destroying one source of infection.

Late blight was reported on potato in the lower Rio Grande Valley of Texas, and in potato-growing counties of southern Louisiana and southern Alabama. Extent of damage has not been reported although the disease was said to spread rapidly and to have become generally distributed in the latter two sections. Very little control was attempted in Alabama, according to reports.

Except for the reports from Florida and one from Indiana, all the records of occurrence on tomato so far involve seedling transplants shipped from outside sections. Source of the infected transplants was Florida or the Texas Lower Rio Grande Valley, as shown on the map.

Very careful and thorough inspection of the Georgia plant-growing area has not revealed any late blight infection of tomato seedlings grown there.

In Indiana, the infection observed on tomato was in a greenhouse that presented particularly favorable conditions for late blight development. Infection apparently originated from remnants of a severely attacked fall crop. Flats of seedlings intended for the local home garden trade were affected, as well as other plants.

Downy Mildew on "Cucurbits"

IN southern Florida downy mildew has been present since the latter part of October. In the Homestead area Yellow Crookneck summer squash planted throughout the winter is commonly affected, and, since downy mildew attacks the maturing crop, no control is practiced. The disease was reported in March as very serious in central Florida on cucumbers. Dry weather later in the month reduced attack on both cucumbers and watermelon in various parts of the State, but activity apparently was reviving with more favorable conditions in the early part of April.

"Dithane D-14," "Parzate," "Zerlate," various copper compounds, and sulfur were reported as being used for control. In specific instances mentioned, "Zerlate" and "Dithane D-14" gave excellent control. In some cases, however, "Dithane D-14" and "Parazate" were not as effective as expected.

Figure 3 shows distribution and severity on the various hosts.

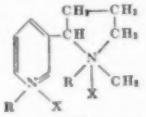
Industry Patents

2,466,182. SPRAY NOZZLE. Patent issued April 5, to Donald J. Peeps, Toledo, Ohio, assignor to the De Vilbiss Co., Toledo. A spray nozzle utilizing air for atomizing and directing coating material upon surfaces facing in various directions, the rear end of the nozzle being adapted to communicate with a source of supply for the air and material, a mixing and discharge chamber extending axially through the nozzle from said end, an intermediate elongated cylindrical section of the chamber, an enlarged forward end of the chamber with a diameter greater than that of the cylindrical section, an inwardly extending truncated annular ridge forming a restricted communicating passage between the cylindrical section and the enlarged forward end of the chamber, forwardly directed discharge port means in the enlarged forward end of the chamber, and laterally directed discharge port means in the chamber immediately to the rear of the restricting ridge.

2,466,544. APPARATUS FOR STACKING AND CONVEYING OBJECTS. Patent issued April 5, to George H. Harrod, E. Greenwich, R. I., assignor to Bostitch, Inc., a corporation of Rhode Island. An apparatus comprising continuously moving conveying means, means for supporting objects in stacked relationship adjacent the conveying means, relatively stationary means for guiding the objects to maintain them in alined relationship, a rotary spider pivoted on an axis below the conveying means and having radial arms adapted to be projected into upright position above the conveying means in opposed relation to the fixed guiding means to form a compartment for the objects, means for releasing the supporting means to lower the stack onto the conveying means, and means operated concurrently therewith for rotating the spider to release its arm from the stack to cause the latter to be transported by the conveying means while moving another arm into position above the conveying means to form a compartment for the next succeeding stack deposited on the supporting means.

2,466,663. FUNGICIDE CONTAINING CAPRYLIC ACID AND ITS SALT. Patent issued April 5, to Walter R. Russ, Little Falls, N. J., and Charles Hoffman, Scarsdale, Thomas R. Schweitzer, Bellaire, and Gaston Dalby, New York, N. Y. A composition for inhibiting the growth of pathogenic micro-organisms on living tissues which contains a mixture of caprylic acid and a salt of caprylic acid and a diluent medium, said composition having a pH between 4.5 and 10.5, said mixture of caprylic acid and salt of caprylic acid comprising more than 1.0% of said composition.

2,466,788. FUNGICIDAL NICOTINIUM SALT COMPOSITIONS. Patent issued April 12, 1949, to C. F. Woodward, Abington, Pa., and Frank L. Howard, Kingston and Harry L. Keil, Wakefield, R. I., and Leopold Weil, Philadelphia, Pa., assignors to the United States of America as represented by the Secretary of Agriculture. A fungicidal composition comprising a carrier in which is incorporated a nicotinium salt having the general formula



wherein R is a member of the group consisting of aralkyl and substituted aralkyl, and X is a member of the group consisting of chloride, bromide, iodide, cyanide, thiocyanate, and fatty acid anions having from 2 to 18 carbon atoms.

2,467,235. OMEGA-THIOCYANOALKYL ESTERS AND INSECTICIDAL COMPOSITIONS CONTAINING SAME. Patent issued to N. E. Searle, Wilmington, Del., assignor to E. I. duPont de Nemours & Co., Inc., Wilmington. An insecticidal composition containing as an essential active ingredient in solution in a hydrocarbon an omega-thiocyanoalkyl ester having the formula AO—R—SCN, wherein A is an alkanoyl radical of two to three carbon atoms, and R is a polymethylene radical of four to five carbon atoms connecting the acyloxy and thiocyano groups.

2,467,491. COPPER FUNGICIDES AND PROCESS OF PRODUCING SAME. Patent issued April 19, to A. A. Nikitin, Copperhill, Tenn., assignor to Tennessee Copper Co., New York. A fungicide containing a major proportion of a basic copper salt together with 1–10 percent zinc calculated as zinc oxide and 0.5–3.5 percent fatty acid soap.

2,467,859. PREPARATION OF PYRETHRIN CONCENTRATE. Patent issued April 19, 1949, to N. A. Sankowsky, Scotch Plains, N. J., assignor to Standard Oil Development Co. The process for preparing an active pyrethrin concentrate from a petroleum kerosene solution of a pyrethrum oleoresin containing active pyrethrins and inert materials which comprises selectively extracting the kerosene solution with a lower aliphatic alcohol having a lower freezing point than the kerosene and which is substantially immiscible with the kerosene to give an extract containing the pyrethrins with only a small proportion of the kerosene and of the inert materials, separating the resulting alcohol extract from the residual kerosene solution, cooling the separated alcohol extract to a temperature at which the kerosene freezes out as a solid, and filtering out the thus solidified kerosene from the alcohol extract at a temperature in the range of 0° C. to −70° C., whereby the active pyrethrin concentrate is obtained as a filtrate.

Trade Mark Applications

CSDM, in capital letters arranged in circular form, for natural and artificial fertilizers. Filed June 22, 1948, by Compania Swift De Montevideo, S. A. Applicant claims ownership of Uruguayan Registration dated Oct. 10, 1947.

HUMEX, in capital letters, for compost. Filed June 30, 1948, by Chester Livingstone, doing business as Humex Co., Lakewood, Ohio. Claims use since April, 1948.

PAYDIRT, in script letters, for organic compost. Filed July 20, 1948, by Frazer Products, Inc., New York. Claims use since June 16, 1948.

COVER THE EARTH, drawing of liquid being poured on globe, for insecticides, fungicides, herbicides, pesticides, etc. Filed August 29, 1947, by Sherwin-Williams Co., Cleveland, Ohio. Claims use since 1902.

FRUIT BRAND, with word "fruit" in capital letters arched over drawing of grapes and other fruit. For agricultural sulphur. Filed Dec. 8, 1947, by Stauffer Chemical Co., San Francisco, Calif. Claims use since 1908.

SHELL, imprinted on drawing of shell, for oil sprays for vegetation for control of mites and insects thereon; insecticide concentrates, weed killers of petroleum base containing chemical agents, etc. Filed Jan. 27, 1948, by Shell Oil Co., Inc., San Francisco, Calif.

ROBERTSON, in sans serif capital letters, for copper powder for use as insecticides and fungicides. Filed Feb. 6, 1948, by H. H. Robertson Co., Pittsburgh, Pa. Claims use since Mar. 1, 1937.

Pv in capital letters, on shaded diamond background, for weed control chemicals. Filed Apr. 21, 1948, by F. H. Peavey & Co., Minneapolis, Minn. Claims use since Apr. 2, 1948.

MANGASUL, in capital letters, with top side forming an arc, for manganese sulfate in pulverized and concentrated form for use in making agricultural mixtures. Filed Apr. 30, 1948, by Western Electrochemical Co., Los Angeles, Calif. Claims use since Aug. 13, 1947.

BLOOM-O-CIDE, in capital letters, for plant insecticides. Filed May 27, 1948, by Flower Foods, Inc., Maywood, Ill. Claims use since May 15, 1942.

KLORSPRA, in capital letters, for insecticide. Filed Aug. 11, 1948, by Corn States Serum Co., Omaha, Nebraska. Claims use since June 17, 1948.

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No '49 Pa. Fertilizer Conference

Pennsylvania State College has announced that no fertilizer conference will be held in 1949. Dr. H. R. Albrecht, head of the department of agronomy, said, however, that the conference series would probably be resumed in 1950. He said that the conference of 1948 brought the industry up to date, and since so much new work is underway, the results of another year's work should be had before another meeting.

Classified Advertising

POSITIONS OPEN

Entomologist- Biologist: Biologist, with entomology, plant pathology, or horticultural background to participate in team conducting product development, market surveys, and field evaluation on agricultural chemicals. Considerable scope and challenge for man with interest in economic aspects of insecticides, fungicides, and herbicides. Ability to plan program, obtain grower cooperation and contact Station investigators is highly essential. Prefer man under 35 years. Please state age, education, experience, and references. Address Box 354, care of Agricultural Chemicals.

Wanted: Entomologist or Plant Pathologist as national field man. Home office New York. New company, well fixed financially and patent-wise on improved agricultural chemicals. Above normal renumeration for good man. Send resume to D. Frees, 230 Park Ave., New York. Address Box 355, care of Agricultural Chemicals.

Insecticide Sales: Well known insecticide manufacturer, with established territories, desires permanent arrangement with representatives or organizations now selling jobbers noncompetitive lines in several open territories. Address Box 356, care of Agricultural Chemicals.

POSITIONS WANTED

Chemist: Ph.D., with many years of experience in fields of insecticides, herbicides, disinfectants, soaps, waxes and other sanitary chemicals, desires position. Address Box 357 care of Agricultural Chemicals.

Chemical Sales—Salesman with seven years of experience in agricultural chemicals calling on dealers, mixers, etc. desires new connection preferably in charge of branch office for manufacturer. Excellent sales record, covered all states east of Mississippi. For further details, communicate Box 359, care of Agricultural Chemicals.

MISCELLANEOUS

Sales Representation—Established sales office on Pacific Coast with long experience in insecticides, fungicides, and other specialties for agriculture in position to handle non-competitive chemical line for coast territory. Please specify products, manufacturing point. Finest references and contacts. Address Box 360, care of Agricultural Chemicals.

FOR SALE

For Sale: Alpha Naphthaleneacetic Acid and other plant hormones. Continuous supplies available. Address Box 358, care of Agricultural Chemicals.

Dr. Jones Joins Maneely

The recent appointment of Dr. Franklin D. Jones to its consulting staff has been announced by Maneely Chemical Co., Philadelphia, Pa. Dr. Jones was formerly head of the horticultural department of American Chemical Paint Co., Ambler, Pa., where he was prominent in the development of 2,4-D and other plant hormones and weed killers. He will be retained by Maneely as consultant in the operation of the company's processes and products, many of which have extensive use in the agricultural field.

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Cyanamid Appoints Two

The New Product Development Department of American Cyanamid Company, New York, has announced the appointments of Dr. James R. Dudley as Supervisor of New Product Development and John D. McPherson as Supervisor of Market Research Activities.

Dr. Dudley joined the American Cyanamid Company in 1940. He was graduated from Carleton College in 1936 and received his advanced degrees from the University of Iowa.

Mr. McPherson joined the American Cyanamid Company in December 1945 after his release from the Chemical Warfare Service of the United States Army with the rank of Lieutenant Colonel.

Rutgers to Expand Research

Rutgers University has announced that it will establish an Institute of Microbiology at a cost of approximately a million dollars. Dr. Selman A. Waksman, who discovered streptomycin in 1943, will be its first director. Dr. Robert C. Clothier, president of Rutgers, stated that funds for the building to house the institute and a grant of $250,000 toward its operating expenses will come from royalties on the streptomycin patent.

Dr. Waksman, a Rutgers alumnus, has been a member of its staff for 25 years. He assigned his patent to the Rutgers Research and Endowment Foundation.

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New Mathieson Appointees

Mathieson Chemical Corporation has announced changes in its sales department executive staff as the result of the retirement of E. E. Routh, vice president, director of sales. D. W. Drummond has been named vice president, director of industrial chemical sales and S. L. Nevins has been named vice president, Director of Agricultural Chemical Sales.

All heavy chemicals including sulfuric acid will be handled by the industrial chemical sales department. All agricultural chemicals which have been added as the result of recent acquisitions of Southern Acid and Sulphur Company and Standard Wholesale Phosphate & Acid Works, Inc., will be under the direction of the Agricultural Chemical Sales Department.

Another appointment concerned J. S. Whittington, who was named sales manager of agricultural chemicals. He will make his headquarters in Mathieson's executive offices in New York.

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Carswell Advanced by C.S.

T. S. Carswell has been named vice president in charge of research and development of Commercial Solvents Corporation, New York, it was announced recently.

Advertisers' Index

(The Advertisers' Index has been carefully checked but no responsibility can be assumed for any omission.)

P.I.I. Issues 2,4-D Booklet

Pacific Insecticide Institute, San Francisco, has prepared a booklet, "2,4-D . . . Friend of Foe?," prepared as a guide for the careful and effective use of 2,4-D herbicides. Up-to-date instructions include a spray-drift chart for the guidance of applicators, a chapter on when and where to use the material, tips on how to apply it from ground machines and from the air; power dusters, and hand equipment.

The following instructions are given for cleaning equipment which has been used in the application of 2,4-D. "The safest procedure is to use separate equipment for the application of 2,4-D. Where this is not possible the following procedure should be followed: Rinse tank lines, screens, pumps and nozzles thoroughly with water, preferably hot water; pressure chamber should be removed and drained; fill tank then with hot water and add two teaspoonfuls of household ammonia per quart of water and mix; spray out a small amount of solution and leave remainder in tank overnight. Baking soda may also be used for this purpose.

"The equipment should be drained and rinsed several times with hot soapy water, then with kerosene, and finally with hot water and soap. Cleaning should be thorough and efficient for satisfactory results. Washings should be disposed of carefully to avoid injury to valuable plants or contamination of water supplies. Ester forms, being oily, are very apt to be absorbed by the hoses; regardless of whether the rest of the equipment is cleaned, it is advisable to use separate hose lines for 2,4-D applications. If 2,4-D is used in equipment having a wooden tank, the equipment should never be used for other materials."

Copies of the booklet are available from Pacific Insecticide Institute offices, 420 Market St., San Francisco, Calif.

TALE ENDS

THE story is told of a method for control of crabgrass which antedates use of 2,4-D by some twenty years in the State of Kentucky. According to W. W. Magill, Horticultural Field Agent in Lexington, Ky., and reported in April *American Fruit Grower*, growers in Kentucky were for many years controlling crabgrass in their newly-set strawberry fields by forcing geese to pasture in the fields and extending the pasture period through August and September.

No one seems to know exactly why a goose will eat tender crabgrass, saw briars, pursley, pig weeds, and, in fact most any common weed pests and turn up his bill at strawberry foliage, but that is what he does!

One commercial grower recently stated that he considered eight geese on a two-acre patch of berries, to be the equivalent of one man with a hoe working two-thirds of the time during the growing season.

They prefer to do their feeding on the tender grass from late afternoon through the evening, and often during moonlight nights they will be found roving over the field in search of tender grass . . . especially crabgrass.

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The Idaho state legislature, meeting at Boise, has before it a bill proposing a licensing system for the state's farmers. Before being granted a license, they would be required to pass written examinations, testing their knowledge of pests and pest control, weeds and weed control, along with all other phases of husbandry, including wind velocities and the relation of moon cycles to growing periods. If successful, the state commissioner would then authorize applicant, on payment of a $10 license fee, to "plant any and sundry seeds or engage in the raising of chickens, hogs, cattle, sheep or goats."

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Designed to meet every aerosol requirement, "Genetron" dispersants are available for all types of application . . . including household, agricultural, greenhouse and industrial.

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In specialized residual types, where higher percentages of active ingredients are necessary, "Genetron" dispersants make possible a greater flexibility in formulation.

Study the properties of "Genetron" dispersants . . . compare the advantages of these fluorine derivatives. Consider the extra values they can give to your aerosol. Then investigate "Genetron" dispersants for your requirements. For technical data, etc., please make inquiry on business letterhead to—

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7 GREATER VOLUME . . . "Genetron" dispersants offer as much as 20% greater liquid volume and 20% greater gas volume per unit of weight.

8 GREATER AEROSOL EFFICIENCY . . . Improved physical and chemical properties of "Genetrons" assure better dispersion and greater efficiency of aerosol formulations.

9 GREATER UNIFORMITY . . . Less distillation effect . . . *because "Genetron" dispersants were designed specifically for aerosol use,* the desired aerosol vapor pressure, composition and performance are maintained more uniformly throughout liquid discharge from the container.

10 CORRECT PARTICLE SIZE . . . "Genetron" dispersants help produce aerosols with a more ideal and uniform particle size.

11 ECONOMY . . . "Genetron" dispersants are shipped in one-ton cylinders and require less equipment, refrigeration and operational technique in discharging into the finished package.

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